ABSTRACT

The present invention involves processes that utilize an olefinic compound, in particular, hexafluoropropene (HFP) or chlorotrifluoroethene (CFC-1113) as extracting agents in the purification of pentafluoroethane (HFC-125). These processes can utilize recovered HFP as a precursor for the production of heptafluoropropane (HFC-227) or other derivatives.

What is claimed is:

1. A process for recovering pentafluoroethane (HFC-125) comprising the steps of:

(a) providing a first mixture comprising pentafluoroethane (HFC-125) and chloropentafluoroethane (CFC-115); and

(b) distilling said first mixture in the presence of hexafluoropropene (HFP) to separate pentafluoroethane (HFC-125) from a second mixture comprising hexafluoropropene (HFP) and chloropentafluoroethane (CFC-115).

2. The process according to claim 1 wherein said distilling step comprises extractive distillation.

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=> file reg
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=> d his


     FILE 'REGISTRY' ENTERED AT 14:03:43 ON 15 JUL 2004
                E PENTAFLUOROETHANE/CN
L1            1 S E3
                E CHLOROPENTAFLUOROETHANE/CN
                E PENTAFLUOROCHLOROETHANE/CN
L2            1 S E3
                E HEXAFLUOROPROPENE/CN
L3            1 S E3

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L4       367587 S DISTILL? OR DIST# OR DISTN# OR CODISTILL? OR CODIST# OR
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L6          990 S L2 OR CHLOROPENTAFLUOROETHANE# OR PENTAFLUOROCHLOROETHA
L7         6071 S L3 OR HEXAFLUOROPROPENE# OR HFP OR H(W)F(W)P
L8           39 S L4 AND L5 AND L6
L9            3 S L8 AND L7
L10           9 S L4 AND L5 AND L7
L11           3 S L10 AND L6
L12           5 S L4 AND L6 AND L7
L13           3 S L12 AND L5
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L18          21 S L15 NOT (L16 OR L17)
L19          15 S L8 NOT (L16 OR L17 OR L18)


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=> d l16 1-3 ibib abs hitstr hitind
```

L16 ANSWER 1 OF 3 HCA COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 139:199086 HCA
TITLE: Processes for the purification and production of fluoroalkanes
INVENTOR(S): Brandstater, Stephan M.; Cohn, Mitchel; Hedrick, Victoria E.; Iikubo, Yuichi
PATENT ASSIGNEE(S): PCBU Services, Inc., USA
SOURCE: PCT Int. Appl., 28 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

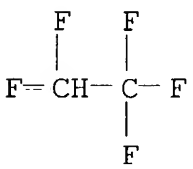
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003068716	A1	20030821	WO 2003-US3962	20030211
US 2003164283	A1	20030904	US 2002-75560	20020214

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

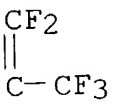
PRIORITY APPLN. INFO.: US 2002-75560 A 20020214

AB Processes that utilize an olefinic compd., in particular, **hexafluoropropene** (**HFP**) or chlorotrifluoroethene (CFC-1113) as extg. agents in the purifn. of **pentafluoroethane** (**HFC-125**) are described. These processes can utilize recovered **HFP** as a precursor for the prodn. of heptafluoropropane (HFC-227) or other derivs.

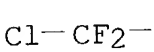
IT **354-33-6P, Pentafluoroethane**
(processes for the purifn. and prodn. of fluoroalkanes)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **116-15-4, Hexafluoropropene**
(processes for the purifn. and prodn. of fluoroalkanes)
RN 116-15-4 HCA
CN 1-Propene, 1,1,2,3,3,3-hexafluoro- (9CI) (CA INDEX NAME)



IT **76-15-3**
(processes for the purifn. and prodn. of fluoroalkanes)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-386
ICS C07C019-08; C07C017-383; C07C021-18; C07C017-087; C07C017-21; C08C019-12
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 23, 48
ST **pentafluoroethane** purifn extractive **distn**; heptafluoropropane prepn purifn; **azeotropic distn** fluoroalkane purifn
IT **Distillation**
(**azeotropic**; processes for the purifn. and prodn. of fluoroalkanes using)
IT **Distillation**
(extractive; processes for the purifn. and prodn. of fluoroalkanes using)
IT **354-33-6P, Pentafluoroethane**
(processes for the purifn. and prodn. of fluoroalkanes)
IT **116-15-4, Hexafluoropropene**
(processes for the purifn. and prodn. of fluoroalkanes)
IT **76-15-3**
(processes for the purifn. and prodn. of fluoroalkanes)
REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L16 ANSWER 2 OF 3 HCA COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 136:218629 HCA
TITLE: Hydrofluorination and fluorination process for the production of octafluoropropane from **hexafluoropropene**

INVENTOR(S): Ohno, Hiromoto; Ohi, Toshio
PATENT ASSIGNEE(S): Showa Denko K. K., Japan
SOURCE: PCT Int. Appl., 29 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

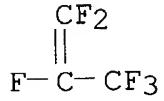
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002018305	A2	20020307	WO 2001-JP7313	20010827
WO 2002018305	A3	20021010		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
JP 2002069014	A2	20020308	JP 2000-260205	20000830
AU 2001080179	A5	20020313	AU 2001-80179	20010827
US 2003157800	A1	20030821	US 2002-111773	20020429
US 6720464	B2	20040413		

PRIORITY APPLN. INFO.:
JP 2000-260205 A 20000830
US 2000-241838P P 20001020
WO 2001-JP7313 W 20010827

AB Octafluoropropane is produced in high yield and selectivity by: (1) hydrofluorinating **hexafluoropropene** with hydrogen fluoride in the gas phase at 150-450° in the presence of a fluorination catalyst to obtain 2H-heptafluoropropane; and (2) fluorinating the 2H-heptafluoropropane obtained in step (1) with fluorine gas in the gas phase at 250-500° in the absence of a catalyst to obtain octafluoropropane.

IT **116-15-4, Hexafluoropropene**
(hydrofluorination and fluorination process for the prodn. of octafluoropropane from **hexafluoropropene**)

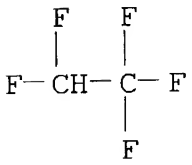
RN 116-15-4 HCA
CN 1-Propene, 1,1,2,3,3,3-hexafluoro- (9CI) (CA INDEX NAME)



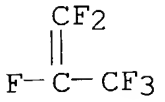
IT **76-15-3 354-33-6, Pentafluoroethane**
(hydrofluorination and fluorination process for the prodn. of octafluoropropane from **hexafluoropropene** contg.)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

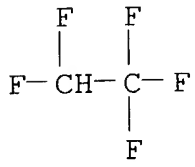
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C019-08
ICS C07C017-087; C07C017-10; C07C017-383; H01L021-30
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 23, 48
ST octafluoropropane manuf **hexafluoropropene** hydrofluorination fluorination
IT Hydrofluorination catalysts
(chromium oxide with indium and/or zinc and/or nickel for the hydrofluorination **hexafluoropropene** with HF into 2H-heptafluoropropane)
IT Fluorination
Hydrofluorination
(hydrofluorination and fluorination process for the prodn. of octafluoropropane from **hexafluoropropene**)
IT **Distillation**
(hydrofluorination and fluorination process for the prodn. of octafluoropropane from **hexafluoropropene** using)
IT 76-19-7P, Octafluoropropane
(hydrofluorination and fluorination process for the prodn. of octafluoropropane from **hexafluoropropene**)
IT 431-89-0P, 2H-Heptafluoropropane
(hydrofluorination and fluorination process for the prodn. of octafluoropropane from **hexafluoropropene**)
IT **116-15-4, Hexafluoropropene**
(hydrofluorination and fluorination process for the prodn. of octafluoropropane from **hexafluoropropene**)
IT 7664-39-3, Hydrogen fluoride, reactions
(hydrofluorination and fluorination process for the prodn. of



RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



CC 35-2 (Chemistry of Synthetic High Polymers)
Section cross-reference(s): 45
ST fluoro refrigerant monomer purifn; sepn **azeotrope** fluoro compd; hydrogen fluoride removal reaction mixt; toxic substance removal fluoro compd
IT 75-10-5P, Difluoromethane 75-45-6P, Difluorochloromethane 75-46-7P, Trifluoromethane **76-15-3P** 115-25-3P, Perfluorocyclobutane 116-14-3P, Tetrafluoroethylene, preparation **116-15-4P**, Hexafluoropropylene **354-33-6P**, **Pentafluoroethane** 359-10-4P, 1,1-Difluorochloroethylene 359-11-5P, Trifluoroethylene 420-46-2P, 1,1,1-Trifluoroethane 811-97-2P, 1,1,1,2-Tetrafluoroethane 7664-39-3P, Hydrogen fluoride, preparation 27987-06-0P, Trifluoroethane 63938-10-3P, Chlorotetrafluoroethane
(methods for purifn. of fluoro refrigerants and monomers)

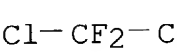
=> d l17 1-8 cbib abs hitstr hitind

L17 ANSWER 1 OF 8 HCA COPYRIGHT 2004 ACS on STN
138:197950 Determination of perfluoroisobutylene by gas chromatography. Dedov, A. S.; Zakharov, V. Yu.; Abramov, O. B.; Vyrazheikin, E. S.; Khakhulina, L. A.; Mamaeva, N. V.; Terent'eva, I. A. (Otkrytoe Aktsionernoe Obshchestvo "Kirovo-Chepetskii Khimicheskii Kombinat im. B. P. Konstantinova", Russia). Russ. RU 2189037 C1 20020910, No pp. given (Russian). CODEN: RUXXE7. APPLICATION: RU 2001-112534 20010507.
AB Perfluoroisobutylene can be detd. by gas chromatog. whereby the mixt. being analyzed is sepd. in a flow of a carrier gas in a chromatog. column using silochrome modified by dibutylphthalate (2-3 wt.%) as a sorbent. The surface of silochrome contains 2-3 μmol/m2 of OH groups due to treatment of the initial sorbent with

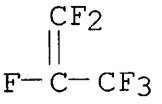
distd. boiling water for 60 h, followed by drying at 120°C and calcination at 300-400°C for 1 h. A detector of const. recombination rate is employed to record the perfluoroisobutylene. A flame ionization detector analyzes the gases generated by the combustion of waste from fluoroorg. industry. A no. of accompanying fluoroorg. compds. are detd. simultaneously with perfluoroisobutylene.

IT **76-15-3P, Pentafluorochloroethane**
116-15-4P, Hexafluoropropylene
(detn. of perfluoroisobutylene by gas chromatog.)

RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



RN 116-15-4 HCA
CN 1-Propene, 1,1,2,3,3,3-hexafluoro- (9CI) (CA INDEX NAME)



IC ICM G01N030-48
ICS G01N030-02

CC 80-6 (Organic Analytical Chemistry)
Section cross-reference(s): 59

IT 75-02-5P, Vinyl fluoride 75-10-5P, Difluoromethane 75-38-7P, Vinylidene fluoride 75-45-6P, Difluorochloromethane 75-46-7P, Trifluoromethane 75-68-3P, 1,1-Difluoro-1-chloroethane 75-71-8P, Difluorodichloromethane 75-73-0P, Tetrafluoromethane **76-15-3P, Pentafluorochloroethane** 76-16-4P, Hexafluoroethane 76-19-7P, Octafluoropropane 79-38-9P, Trifluorochloroethylene 115-25-3P, Octafluorocyclobutane 116-14-3P, Tetrafluoroethylene, analysis **116-15-4P,** Hexafluoropropylene 357-26-6P, Octafluorobut-1-ene 359-11-5P, Trifluoroethylene 420-46-2P, 1,1,1-Trifluoroethane 431-63-0P 593-70-4P, Fluorochloromethane 690-27-7P, 1,1,3,3,3-Pentafluoropropene 690-39-1P, 1,1,1,3,3,3-Hexafluoropropane 1320-37-2P, Tetrafluorodichloroethane 1516-64-9P, trans-Octafluoro-2-butene 1516-65-0P, cis-Octafluorobut-2-ene 2252-84-8P, 1,1,1,2,2,3,3-Heptafluoropropane 2837-89-0P, 1,1,1,2-Tetrafluorochloroethane 5187-89-3P, Perfluoro(methylcyclobutane) 28987-04-4P, Hexafluorochloropropane
(detn. of perfluoroisobutylene by gas chromatog.)

L17 ANSWER 2 OF 8 HCA COPYRIGHT 2004 ACS on STN

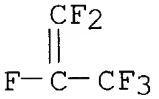
136:39117 Halogenation and **distillation** process for perfluorocyclobutane purification. Malikarjuna, V. N. (E. I. Du Pont de Nemours & Co., USA). U.S. US 6333440 B1 20011225, 7 pp. (English). CODEN: USXXAM. APPLICATION: US 2001-825748 20010404. PRIORITY: US 2000-PV195855 20000407.

AB A process is disclosed for obtaining octafluorocyclobutane of increased purity from a mixt. comprising (a) octafluorocyclobutane and (b) at least one halocarbon impurity which is difficult to sep. from octafluorocyclobutane by **distn.** (e.g., **azeotropes** of octafluorocyclobutane with such halocarbons). The process involves: (1) contacting the mixt. with a catalyst in the vapor phase in the presence HCl and/or HF at a temp. sufficient to react component (b) impurity with HCl and/or HF to provide a product mixt. comprising a halogenated product which is more easily sepd. from octafluorocyclobutane by **distn.** than the unreacted impurity; and (2) sepg. halogenated product obtained in (1) from octafluorocyclobutane by **distn.**

IT **116-15-4P**, Hexafluoropropylene
(halogenation and **distn.** process for perfluorocyclobutane purifn. using)

RN 116-15-4 HCA

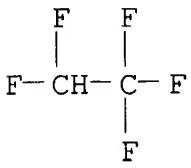
CN 1-Propene, 1,1,2,3,3,3-hexafluoro- (9CI) (CA INDEX NAME)



IT **354-33-6, Pentafluoroethane**
(halogenation and **distn.** process for perfluorocyclobutane purifn. using)

RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-38

NCL 570178000

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 24, 48

ST perfluorocyclobutane purifn halogenation **distn**; octafluorocyclobutane purifn halogenation **distn**

IT **Distillation**

(**azeotropic**; halogenation and **distn.** process for perfluorocyclobutane purifn.)

IT **Distillation**
Halogenation
(halogenation and **distn.** process for perfluorocyclobutane purifn.)

IT Thermal decomposition
(halogenation and **distn.** process for perfluorocyclobutane purifn. using)

IT Hydrogen halides
(halogenation and **distn.** process for perfluorocyclobutane purifn. using)

IT 115-25-3P, Perfluorocyclobutane
(halogenation and **distn.** process for perfluorocyclobutane purifn.)

IT 63938-10-3P, Chlorotetrafluoroethane
(halogenation and **distn.** process for perfluorocyclobutane purifn. using)

IT 1320-37-2P, Dichlorotetrafluoroethane 29759-38-4P, Tetrafluoroethane 37145-46-3P, Pentafluoropropene 89331-22-6P, Propene, Chloropentafluoro-
(halogenation and **distn.** process for perfluorocyclobutane purifn. using)

IT 116-14-3P, Tetrafluoroethylene, preparation **116-15-4P**, Hexafluoropropylene
(halogenation and **distn.** process for perfluorocyclobutane purifn. using)

IT 75-45-6, Chlorodifluoromethane **354-33-6**, **Pentafluoroethane** 7647-01-0, Hydrogen chloride, reactions 7664-39-3, Hydrogen fluoride, reactions
(halogenation and **distn.** process for perfluorocyclobutane purifn. using)

L17 ANSWER 3 OF 8 HCA COPYRIGHT 2004 ACS on STN
116:135528 Performance-oriented packaging standards; changes to classification, hazard communication, packaging and handling requirements based on UN standards and agency initiative. (United States Dept. of Transportation, Washington, DC, 20590-0001, USA). Federal Register, 55(246), 52402-729 (English) 21 Dec 1990. CODEN: FEREAC. ISSN: 0097-6326.

AB The hazardous materials regulations under the Federal Hazardous Materials Transportation Act are revised based on the United Nations recommendations on the transport of dangerous goods. The regulations cover the classification of materials, packaging requirements, and package marking, labeling, and shipping documentation, as well as transportation modes and handling, and incident reporting. Performance-oriented stds. are adopted for packaging for bulk and nonbulk transportation, and SI units of

measurement generally replace US customary units. Hazardous material descriptions and proper shipping names are tabulated together with hazard class, identification nos., packing group, label required, special provisions, packaging authorizations, quantity limitations, and vessel stowage requirements.

IT **76-15-3 116-15-4**, Hexafluoropropylene
(packaging and transport of, stds. for)

L17 ANSWER 4 OF 8 HCA COPYRIGHT 2004 ACS on STN

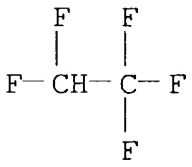
73:14155 Separation of perfluorocarbons from hydrogen-containing fluorocarbons. Ikubo, Yuichi (Onoda Cement Co., Ltd.). Ger. DE 1468451 19700115, 5 pp. (German). CODEN: GWXXAW. PRIORITY: JP 19631025.

AB Mixtures of perfluorocarbons and hydrogen-contg. fluorocarbons are sepd. by **distn.** or extn. after treatment with acetone, AcEt, or HCONMe2. Thus, a mixt. of 96.44% tetrafluoroethylene, 1.01% fluoroform, 1.75% hexafluoropropylene, 0.49% **pentafluoroethane**, 0.07% octafluorocyclobutane, and 0.1% tetrafluorochloroethane was passed through acetone at 24° under atm. pressure at a rate of 15 ml/min. After 50 min. the effluent stream contained 97.4% 1-tetrafluoroethylene, 0.35% fluoroform, 1.70% hexafluoropropylene, 0.41% **pentafluoroethane**, 0.08% octafluorocyclobutane, and 0.05% tetrafluorochloroethane.

IT **354-33-6**
(removal of, from fluorocarbons)

RN 354-33-6 HCA

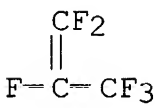
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **116-15-4**
(sepn. of, from fluoro paraffins)

RN 116-15-4 HCA

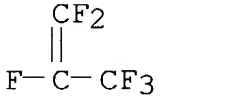
CN 1-Propene, 1,1,2,3,3,3-hexafluoro- (9CI) (CA INDEX NAME)



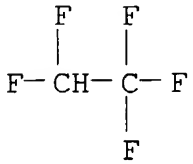
IC C07C

CC 23 (Aliphatic Compounds)
IT 75-46-7 **354-33-6** 2837-89-0
(removal of, from fluorocarbons)
IT 115-25-3 116-14-3, preparation **116-15-4**
(sepn. of, from fluoro paraffins)

L17 ANSWER 5 OF 8 HCA COPYRIGHT 2004 ACS on STN
61:68779 Original Reference No. 61:11891f-h Vinylamines from haloamides. Speziale, Angelo J.; Freeman, Robert C. (Monsanto Co.). US 3145230 19640818, 3 pp. (Unavailable). APPLICATION: US 19620316.
AB The reaction of PCl5 with a chlorinated acetamide or acetanilide gives a vinylamine. Thus, a mixt. of 73.6 parts N,N-diethyl-2,2-dichloroacetamide and 83.3 parts PCl5 is heated to 50°, the resulting clear liquid **distd.**, and the material collected at 67-75° at 11 mm. refractionated to give 1,2,2-trichloro-N,N-diethylvinylamine, b18 87-8°. In an analogous fashion, 1,2,2-trichloro-N,N-dimethyl-vinylamine, b24 66°, and 1,2,2-trichloro-N,N-diphenylvinyl-amine, m. 49-50°, were obtained. To a soln. of 16 g. N-methyl-2-chloroacetamide in C6H6 was added 21 g. PCl5 and this mixt. heated 1 hr. at 40°. **Distn.** yielded N-methyl-N-phenyl-1,2,2-trichlorovinylamine, b0.4-0.7 94-8°, n22D 1.5847.
IT **116-15-4**, Propene, hexafluoro-
(in heptafluoropropane manuf.)
RN 116-15-4 HCA
CN 1-Propene, 1,1,2,3,3,3-hexafluoro- (9CI) (CA INDEX NAME)



IT **354-33-6**, Ethane, pentafluoro-
(manuf. of, from tetrafluoroethylene)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



NCL 260576000
CC 33 (Aliphatic Compounds)

IT **116-15-4**, Propene, hexafluoro-
(in heptafluoropropane manuf.)
IT 116-14-3, Ethylene, tetrafluoro-
(in **pentafluoroethane** manuf.)
IT 33660-75-2, Propane, heptafluoro-
(manuf. from **hexafluoropropene**)
IT **354-33-6**, Ethane, pentafluoro-
(manuf. of, from tetrafluoroethylene)

L17 ANSWER 6 OF 8 HCA COPYRIGHT 2004 ACS on STN
49:68831 Original Reference No. 49:13083c-h The chemistry of perfluoro acids and their derivatives. VI. The Hofmann reaction. Husted, Donald R.; Kohlhase, Wm. L. (Minnesota Mining & Manufg. Co., St. Paul, MN). Journal of the American Chemical Society, 76, 5141-4 (Unavailable) 1954. CODEN: JACSAT. ISSN: 0002-7863. OTHER SOURCES: CASREACT 49:68831.

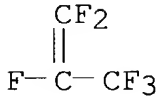
AB cf. C.A. 48, 3894a. A new method of prepn. of monobromoperfluoroalkanes by the action of NaOBr on a perfluoroamide having more than 2 C atoms is described. A possible reaction sequence is presented. Br (28.8 g.) added dropwise below 5° to 36 g. NaOH in 100 cc. H2O, the mixt. treated with 32 g. C3F7CONH2 (I) and 50 cc. H2O, stirred 1 hr., warmed during 1 hr. to 20°, and refluxed 2.5 hrs., and the cold trap condensate redistd. gave about 16 cc. (65-70%) C3F7Br (II), b742 15-15.2°. I (71.2 g.) added to 80 g. NaOH and 200 cc. H2O contg. 28 g. Cl, and the mixt. heated 8 hrs. at 105° gave about 5 cc. Dry Ice-trap condensate which vaporized and washed with dil. HCl gave C3F7Cl, b740 8-14°, contg. about 10% C3F7H (III); the remaining aq. soln. cooled, extd. with Et2O, and **distd.** to dryness gave in an attached Dry Ice-trap a liquid contg. about 66% C2F5H and 34% CF3CF:CF2, which both may have been formed from the heating of the Na salt of the acid obtained by the hydrolysis of the amide. NaOH (36 g.), 100 cc. H2O, 45.6 g. iodine, and 32 g. I **distd.** to dryness gave 25-40% III and several unidentified products; approx. 50% of the I was recovered as the acid or the Na salt, and about 10% NH4F. NaOH (36 g.), 100 cc. H2O, 28.8 g. Br, and 24.5 g. C2F5CONH2 gave about 10-12 cc. C2F5Br, b. -18.5 to -17.5°. CF3CONH2 did not give CBrF3 under the same conditions. I (21.3 g.) and 11.3 g. Ag2O stirred about 36 hrs. in 100 cc. refluxing Et2O, and the crystals filtered, washed with Et2O, air-dried, and treated with Br in CF3CO2H by the method of Park, et al. (C.A. 48, 6386b), and the product sublimed in vacuo gave C3F7CONHBr (IV), m. 78-9.2°. Equimol. amts. of C3F7CONHAg and iodine finely ground in a mortar and let stand 72 hrs. in a stoppered bottle gave a mixt. of C3F7CONHI (V), and AgI which upon attempted sublimation gave I, m. 105°. A sample of the mixt. heated in a sealed tube 72 hrs. at 100° gave C3F7I. IV (0.4 g.) and 25 cc. 30% aq. NaOH refluxed 5 hrs. gave II. CF3CONHBr (1

g.) m. 63°, and 2 cc. 30% aq. NaOH g. gave CBrF3. V-AgI mixt. (2.75 g.) yielded upon alk. hydrolysis 300 cc. III. IV refluxed 8 hrs. with H2O gave I. V was so unstable towards H2O that it could not be handled in a humid atm. C3F7CO2H (5 g.) and 6.19 cc. 33% aq. NaOH refluxed 8 hrs., the mixt. treated with an addnl. 10 cc. 33% aq. NaOH and again refluxed 8 hrs. gave in an attached cold trap III. Br (1.86 g.) dissolved in 7.35 cc. aq. NaOH and the mixt. then treated with 5 g. C3F7CO2H gave III. The 3 most prominent Debye-Scherer x-ray powder lines are tabulated for V, AgI, V-AgI mixt., I, and C3F7CONHAg.

IT **116-15-4**, Propene, hexafluoro- **354-33-6**, Ethane, pentafluoro-
(prepn. of)

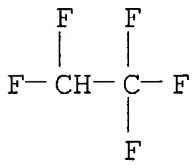
RN 116-15-4 HCA

CN 1-Propene, 1,1,2,3,3,3-hexafluoro- (9CI) (CA INDEX NAME)



RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



CC 10 (Organic Chemistry)

IT **116-15-4**, Propene, hexafluoro- **354-33-6**, Ethane, pentafluoro- 354-55-2, Ethane, bromopentafluoro- 359-45-5, Acetamide, N-bromo-2,2,2-trifluoro- 377-49-1, Butyramide, 2,2,3,3,4,4,4-heptafluoro-, silver deriv. 377-50-4, Butyramide, N-bromo-2,2,3,3,4,4,4-heptafluoro- 377-51-5, Butyramide, 2,2,3,3,4,4,4-heptafluoro-N-iodo- 422-85-5, Propane, 1-bromoheptafluoro- 422-86-6, Propane, 1-chloroheptafluoro- 662-50-0, Butyramide, 2,2,3,3,4,4,4-heptafluoro- 754-34-7, Propane, heptafluoro-1-iodo- 2252-84-8, Propane, 1,1,1,2,2,3,3-heptafluoro-
(prepn. of)

L17 ANSWER 7 OF 8 HCA COPYRIGHT 2004 ACS on STN

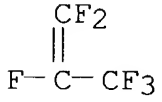
48:64093 Original Reference No. 48:11316h-i,11317a-g Pyrolyses of the salts of the perfluoro carboxylic acids. La Zerte, J. D.; Hals, L. J.; Reid, T. S.; Smith, G. H. (Minnesota Mining & Manufg. Co., St.

Paul). Journal of the American Chemical Society, 75, 4525-8 (Unavailable) 1953. CODEN: JACSAT. ISSN: 0002-7863.

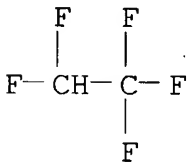
AB The thermal decompn. of a no. of salts of the straight-chain perfluoro acids has been investigated. From the Na salts, terminally unsatd. perfluoroolefins were prepd. in yields ranging from 65 to 100%. The reaction is represented by the equation CnF2n+1CF2CF2CO2Na → CnF2n+1CF:CF2 + CO2 + NaF. Salts of other metals of the groups I, II, and III of the periodic table gave varying yields of olefins. C3F7CO2Ag (I) and C7F15CO2Ag (II) decompd. to give C6F14 and C14F30, resp. C2F4 was formed when a mixt. of CF3CO2Na and NaOH was heated. A series of fluorocarbon hydrides, CnF2n+1H, was prepd. by heating the salts of perfluoro acids in (CH2OH)2. The NH4, Li, Na, K, Ca, Sr, and Ba salts of the perfluoro acids were all prepd. by neutralizing an aq. soln. of the acid with a soln. of the hydroxide. (C3F7CO2)2Mg and (C3F7CO2)2Pb were obtained from aq. C3F7CO2H (III) and the metal oxides at slightly above 25°; both salts were hygroscopic; the vacuum-dried Pb salt was further dried by **azeotropic distn.** with CCl4. I and II were prepd. by treating freshly prepd. Ag2O with the dil. aq. acids. (C3F7CO2)2Cu was obtained by passing dry air into a mixt. of finely divided Cu powder and excess III at 120°. (C3F7CO2)3Al was prepd. by the method of Hood and Ihde (C.A. 44, 7228i) from AlCl3 and excess III in the presence of (C3F7CO2)2O (IV) at 100°. The purity of the salts had a great influence on the decompn. reaction. In the presence of an inorg. base, the pyrolysis of the salts gave products contaminated with fluorocarbon monohydrides; to avoid this, the pH of the salt solns. was adjusted to pH 5-7. H2O vapors in the pyrolysis zone also led to the formation of H-contg. compds. The pyrolyses were carried out, in general, in Pyrex flasks; the rate of the decompn. was controlled by varying the temp.; the resulting volatile products were passed through 2 scrubbers contg. 15% KOH, dried over P2O5, and condensed in a cold trap. The thermal stabilities of some salts of III were detd. by heating small weighed samples 0.5 hr. at 20-5° intervals until almost complete decompn. was obtained; the temp. at which 20% decompn. was obtained (given) was for the following salts: NH4 185° K 200°, Na 235°, Ba 275°, Sr 275°, Ag 295°; and for (CF3)2CFCO2Na 185°. The Na salts of higher straight-chain perfluoro acids underwent 20% decompn. at 240-50°, and C4F9CO2K at 175-80°. The Na and Ba salts of CF3CO2H gave CF3COF and (CF3CO)2O; the same products were obtained from the Li and Ca salts. The pyrolysis of CF3CO2Na in the presence of solid NaOH proceeded at about 270° exothermically to give C2F4, along with some CF3COF and CHF3; the min. yield of C2F4 was 32% in better than 98% purity; 1% by wt. of Pr3N was always added to the C2F4 to prevent the explosive polymerization of the monomer. The following salts of III were pyrolyzed and the pyrolysis products detd. (the decompn.

temp., % yield CF3CF:CF2, and the other fluorinated products formed given): Li, 240-50°, 20, C3F7COF (V), IV, III; K, 215-35°, 98, -; Mg, 275-300°, <5,high-boiling liquid; Ca, 275-300°, <10, V, IV, III; Sr, 275-85°, 25, V, III; Ba, 265-75°, 78, -; Pb, 300-5°, <10, V, IV, some III; Cu, trace, V, unidentified product; Al, 250°, <5, V, III, C2F6; NH4, 180-200°, 0, CF3CF2CF2H; Ag, 300-20°, 45, C6F14. C4F9CO2K (1681 g.) and 907 g. (CH2OH)2 heated 5 hrs. at 170-90° gave 1169 g. cold-trap condensate which on fractionation yielded 1017 g. (84%) CF3(CF2)3H, b740 14°, λmax. 3015 cm.-1 (C-H). Similarly were prepd. from the Na salts of the appropriate perfluoro acids the following hydrides CF3(CF2)nH (VI) (n, % yield, b.p./740 mm. given): 1, 98, -50°; 2, 97, -16°; 4, 80, 46°; 6, 60, 94°, n25D 1.2690. C5F11CO2Na (210 g.), prepd. in 93% yield by neutralizing C5F11CO2H with aq. NaOH, pyrolyzed at about 250° yielded 141 g. (90%) C3F7CF:CF2, b. 28-9.0°, n25D 1.2571, λmax. 1795 cm.-1 Similarly were prepd. the following olefins from the appropriate Na salts (compd., % yield, b.p., and n15D given): C2F4, 90, -74°, -; CF3CF:CF2, 97, -29°, -; C2F5CF:CF2, 91, 1°, -; C5F11CF:CF2, 86, 81, 1.2782; C7F15CF:CF2, 65, 123°, 1.2868. The infrared absorption spectra of VI with n = 2, 3, 4, and 6 all showed C-H absorption in the range 2940-2990 cm.-1.

IT **116-15-4**, Propene, hexafluoro-
(formation of, in pyrolysis of heptafluorobutyric acid salts)
RN 116-15-4 HCA
CN 1-Propene, 1,1,2,3,3,3-hexafluoro- (9CI) (CA INDEX NAME)



IT **354-33-6**, Ethane, pentafluoro-
(prepn. of)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



CC 10 (Organic Chemistry)
IT **116-15-4**, Propene, hexafluoro-

(formation of, in pyrolysis of heptafluorobutyric acid salts)
IT 307-62-0, Tetradecane, triacontafluoro- **354-33-6**, Ethane, pentafluoro- 354-34-7, Acetyl fluoride, trifluoro- 355-42-0, Hexane, tetradecafluoro- 355-63-5, 1-Heptene, tetradecafluoro- 357-26-6, 1-Butene, octafluoro- 375-17-7, Butane, 1,1,1,2,2,3,3,4,4-nonafluoro- 375-61-1, Pentane, 1,1,1,2,2,3,3,4,4,5,5-undecafluoro- 375-83-7, Heptane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7-pentadecafluoro- 376-22-7, 1-Nonene, octadecafluoro- 376-87-4, 1-Pentene, decafluoro- 2252-84-8, Propane, 1,1,1,2,2,3,3-heptafluoro-
(prepn. of)

L17 ANSWER 8 OF 8 HCA COPYRIGHT 2004 ACS on STN
48:42260 Original Reference No. 48:7534i,7535a-i,7536a-f The preparation and some properties of the C4F8 olefins. Brice, T. J.; LaZerte, J. D.; Hals, L. J.; Pearlson, W. H. (Minnesota Mining & Manufg. Co., St. Paul). Journal of the American Chemical Society, 75, 2698-702 (Unavailable) 1953. CODEN: JACSAT. ISSN: 0002-7863.
AB The olefins C2F5CF:CF2 (I), (:CFCF3)2 (II) (mixt. of cis and trans isomers), and (CF3)2C:CF2 (III) have been prepd. by pyrolytic reactions and a no. of phys. and chem. properties detd. The infrared absorption spectra of I, II, and III are recorded. I has a strong C:C absorption band at 5.58 μ shown by all straight-chain fluorocarbon olefins contg. a terminal double bond, except C2F4. III has a strong C:C absorption and at 5.71 and the mixt. of cis- and trans-II a weak band at 5.77 μ. Examn. of the infrared spectrograms of a series of fractions from the **distn.** of II showed noticeable and systematic variations in the intensities of certain bands which could not be attributed to impurities. The bands at 5.77, 9.05, 10.53, and 13.83 μ increased in intensity as the fractionation proceeded while the bands at 11.33 and 14.60 μ decreased in intensity; this indicated that 2 components, the cis and trans isomers, which could not be completely sepd. by **distn.** were present. The 1st group of bands, including the C:C band at 5.77 μ, is assocd. with the higher-boiling isomer, which was assigned the cis configuration because of its more intense C:C absorption. The bands decreasing in intensity are characteristic of the trans-II, the lower-boiling isomer. The relative amts. of the cis and trans isomers were tentatively established by the study of a bromination-debromination cycle. The photochem. bromination of II contg. any ratio of cis and trans isomers was expected to form approx. equal amts. of the meso- and dl-dibromides; debromination by either a cis or a trans mechanism would produce equimolar amts. of the cis- and trans-II. The infrared spectrograms of the final product and the starting material were very nearly the same, indicating that the II formed by high-temp. pyrolytic reactions has essentially the same isomer ratio as the product of the bromination-debromination cycle and is

considered to consist of nearly equal amts. of the cis and trans isomers. A II mixt. obtained by treatment with very strong acid catalysts and contg. a higher trans-cis ratio than the usual debromination product gave, when put through the cycle, a II mixt. having the usual trans-cis ratio of the debromination products. This shows that mixts. having a different compn. than the pyrolysis products still give the same debromination products. I, II, and III undergo, in general, the same types of chem. reactions but with marked differences in the ease of reaction. Br adds rapidly to I at room temp., more slowly to II, and with great difficulty to III. The bromination of III was accomplished by adding H2O and AcNH2 to the II and Br and irradiating the mixt. with ultraviolet light. The order of the reactivity of the C4F8 olefins with alcs. in the presence of basic catalysts is reversed: III is much more reactive than either I or II; all 3 add alcs. in the presence of basic catalysts to form alkyl β-hydroperfluoroalkyl ethers; only III will add alcs. in neutral or weakly acidic mediums. The structures of the ethers formed by the addn. of alcs. to III and I are (CF3)2CHCF2OR and C2F5CHFCF2OR. The yields of the satd. ethers from III were usually about 60%, whereas the yields from I were very low because of loss of HF and other side-reactions. The ether from II and MeOH was not definitely characterized but appeared to be a diaddn. product. The mechanism of the addn. of alcs. appears to involve an initial attack of a nucleophilic OR- on the double bond. III may be pictured as having structures of the type .hivin.FCF2:C(CF3)C+F2; the 6-fold multiplicity of this form should greatly enhance the nucleophilic attack. II could similarly have 3 structures of the type CF3C+FCF:CF2.hivin.F and would be expected to be quite susceptible to base attack, though perhaps less so than III. Since only 2 identical structures of the type CF3CF(.hivin.F):CFC+F2 are possible for I, the lesser reactivity of this olefin can be expected. C4F9CO2H, b. 140°, n25D 1.294, was prepd. by the electrochem. process, neutralized in H2O with aq. NaOH, dried in vacuo at 80-100°, the resulting Na salt (615 g.) heated at 290-300°, the gaseous products scrubbed with 30% KOH, dried over P2O5, and collected in a liquid-air trap, yielded 386 g. (90%) crude olefin, virtually all I, with only minor amts. of C3F6, C2F4, CHF3, and C2HF5; 170 g. of this yielded 94 g. (55%) of a center cut of I b740 1°, d0 1.5443. C4F9CO2K (prepd. by the neutralization of the aq. acid to pH 5 and evapn. to dryness) (78.5 g.) pyrolyzed at 165-200°, and the resulting C4F8-olefins (42 g.) fractionated yielded 27.6 g. of a mixt. of 80% II and 20% I; 11.6 g. of the mixt. let stand about 6 hrs. with 3.0 g. Br in a sealed tube, cooled, the residual Br removed with Hg, and the product **distd.** gave 8.0 g. (80%) II (over-all yield 36%), b740 0°, d0 1.5297, contg. traces of SiF4. Refractionated octafluorocyclobutane, b. -4°, passed through a C tube at 700-25° at a rate of 30 g./hr., and the products

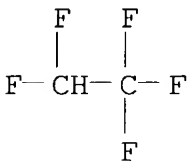
scrubbed with dil. base, dried over P2O5, and fractionated yielded 70% (90% conversion) III, b740 5-6°, b740 6.5°, d0 1.5922, and 5-10% II; III is destroyed by strong bases. I (11.7 g.), 8.0 g. KMnO4, about 12 g. KOH, and sufficient H2O to form a slurry heated 5 days at 85° with shaking in a sealed tube, the mixt. filtered, the filtrate evapd. to dryness, and the residue extd. with EtOH gave 4.8 g. (63%) C2F5CO2K. II (4.6 g.) oxidized similarly with 10.2 g. KMnO4 and 2 g. KOH 48 hrs. at 85° gave 1.5 g. unreacted II and a high yield of CF3CO2Na. III (38.8 g.) heated 8 hrs. at 100° with stirring with 76 g. KMnO4 and 400 cc. H2O in an autoclave gave about 12 g. unreacted III, some CO2, and, from the aq. soln. treated by the procedure of Henne, et al. (C.A. 46, 2484h), 5.8 g. (27% yield, 67% conversion) (CF3)2CO, b746 -26.5°. I (120 g.) bubbled at room temp. through 80 g. Br, and the mixt. scrubbed, dried, and fractionated yielded 58% C2F5CBrFCBrF2, b. 94-5°, and an addnl. 25.6 g., b. 91-4°; analytical sample, b740 95°, n25D 1.3511, d25 2.1279. III (9.3 g.), 5.7 g. Br, 3 drops H2O, and a few crystals of AcNH2 irradiated 3 hrs. in a sealed tube with an ultraviolet lamp, and the high-boiling product (8 g.) fractionated gave 4.0 g. (CF3)2CBrCBrF2, b740 96°, m. 41-5°. Attempts to brominate III thermally at 100° or with ultraviolet light at room temp. in the absence of AcNH2 were unsuccessful. Intercuts from a series of III prepns. contg. II were combined, the II content was detd. by infrared analysis, the mixt. exposed, with slightly more than enough Br to convert the II, in a sealed tube to ultraviolet light, the unreacted III boiled off, and the residue treated with Hg to remove excess Br and fractionated to yield (CF3CBrF)2 (IV), b740 96°, n25D 1.3538, d25 2.2673. IV (52 g.) added slowly to 200 cc. boiling glacial AcOH and 20 g. Zn dust, and the mixt. refluxed 3 hrs. yielded 33 g. II. A larger quantity of II prepd. in the same manner was treated with KOH and P2O5 and fractionated to yield a II, virtually identical with the II that had not been base treated. Into 65 g. EtOH was passed at about 9° 50 g. III, the mixt. poured on ice, and the H2O-insol. layer dried over CaSO4 and CaO and fractionated to give 25 g. (41%) (CF3)2CHCF2OEt, b743 83°, n25D 1.2908, d25 1.3946, γ25 16.3 dynes/cm. KMnO4 (80 g.), 50 g. KOH, 100 g. III, and 300 cc. H2O heated overnight at 90° in sealed tubes yielded 12.6 g. (CF3)3CH, b. 11-12°, resulting from the addn. of HF to III. Br(CF2)4Br, b740 97°, n25D 1.3495, d25 2.0979, was prepd. from (CF2CF2CO2Ag)2 and Br.

IT **116-15-4**, Propene, hexafluoro- **354-33-6**, Ethane, pentafluoro-
(prepn. of)

RN 116-15-4 HCA

CN 1-Propene, 1,1,2,3,3,3-hexafluoro- (9CI) (CA INDEX NAME)

IT **354-33-6P, Pentafluoroethane**
(process for purifying **pentafluoroethane**)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

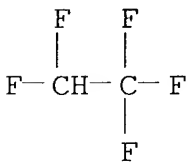


IC ICM C07C019-08
ICS C07C017-383
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
ST **pentafluoroethane** purifn
IT Esters, uses
Ketones, uses
(extn. solvents; process for purifying **pentafluoroethane**
)
IT **Distillation**
(process for purifying **pentafluoroethane**)
IT **76-15-3**
(process for purifying **pentafluoroethane**)
IT 64-17-5, Ethanol, uses 75-05-8, Acetonitrile, uses 75-52-5, Nitromethane, uses 108-94-1, Cyclohexanone, uses 141-78-6, Ethyl acetate, uses
(process for purifying **pentafluoroethane**)
IT **354-33-6P, Pentafluoroethane**
(process for purifying **pentafluoroethane**)

L18 ANSWER 2 OF 21 HCA COPYRIGHT 2004 ACS on STN
135:359389 **Extractive distillation** process for the purification of **pentafluoroethane** from mixtures containing **chloropentafluoroethane** using acetals as the extractive agent. Azzali, Daniele; Basile, Giampiero (Ausimont S.p.A., Italy). Eur. Pat. Appl. EP 1153907 A2 20011114, 9 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-109907 20010424. PRIORITY: IT 2000-MI1006 20000509.
AB An **extractive distn.** process for sepg. **pentafluoroethane** (**HFC-125**) from a mixt. contg. **pentafluoroethane** (**HFC-125**) and **chloropentafluoroethane** (**CFC-115**) consists of using as the extg. agent an acetal R1OCH2OR2 [R1, R2 = (un)branched C1-3 alkyl; e.g., dimethoxymethane].
IT **354-33-6P, Pentafluoroethane**
(**extractive distn.** process for the purifn. of

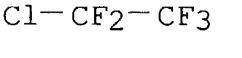
pentafluoroethane from mixts. contg. **chloropentafluoroethane** using acetals as the extractive agent)

RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**
(**extractive distn.** process for the purifn. of **pentafluoroethane** from mixts. contg. **chloropentafluoroethane** using acetals as the extractive agent)

RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-386
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 23, 48
ST **pentafluoroethane extractive distn** purifn; acetal **extractive distn** purifn **pentafluoroethane**; dimethoxymethane **extractive distn** purifn **pentafluoroethane**
IT Acetals
(**extractive distn.** process for the purifn. of **pentafluoroethane** from mixts. contg. **chloropentafluoroethane** using acetals as the extractive agent)
IT **Distillation**
(**extractive; extractive distn.** process for the purifn. of **pentafluoroethane** from mixts. contg. **chloropentafluoroethane** using acetals as the extractive agent)
IT 109-87-5, Dimethoxymethane
(**extractive distn.** process for the purifn. of **pentafluoroethane** from mixts. contg. **chloropentafluoroethane** using acetals as the extractive agent)
IT **354-33-6P, Pentafluoroethane**
(**extractive distn.** process for the purifn. of

pentafluoroethane from mixts. contg. **chloropentafluoroethane** using acetals as the extractive agent)

IT **76-15-3**
(**extractive distn.** process for the purifn. of **pentafluoroethane** from mixts. contg. **chloropentafluoroethane** using acetals as the extractive agent)

L18 ANSWER 3 OF 21 HCA COPYRIGHT 2004 ACS on STN
130:326793 Process for purifying perfluorinated products, especially nitrogen trifluoride for the electronics industry. Mahler, Barry Asher; Miller, Ralph Newton; Kao, Chein-Ping Chai (E. I. Du Pont de Nemours & Co., USA). PCT Int. Appl. WO 9924358 A1 19990520, 59 pp. DESIGNATED STATES: W: AL, AM, AU, AZ, BA, BB, BG, BR, BY, CA, CN, CU, CZ, EE, GE, HU, ID, IL, IS, JP, KG, KP, KR, KZ, LC, LK, LR, LT, LV, MD, MG, MK, MN, MX, NO, NZ, PL, RO, RU, SG, SI, SK, SL, TJ, TM, TR, TT, UA, US, UZ, VN, YU, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US23965 19981110. PRIORITY: US 1997-64993 19971110; US 1998-86146 19980520; US 1998-189322 19981109.

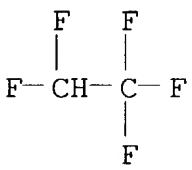
AB Nitrogen trifluoride (NF3) contg. less than 10 ppm-M impurities, e.g., tetrafluoromethane (PFC-14), is purified by low-temp. **azeotropic** and **extractive distn.** processes using entraining agents, e.g., HCl, for sepg. NF3 and PFC-14 from each other and from mixts. with other gases in processing of materials in the electronics industry.

IT **76-15-3, CFC-115 354-33-6, HFC-125**
(nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)

RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

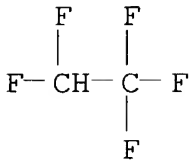
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C01B021-083
CC 48-1 (Unit Operations and Processes)
Section cross-reference(s): 49, 76
ST nitrogen trifluoride purifn **azeotropic distn;**
extractive distn nitrogen trifluoride purifn;
carbon tetrafluoride removal NF3 **azeotropic distn**
IT **Distillation**
(**azeotropic,** low-temp.; nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT Hydrocarbons, uses
(chloro; nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT Hydrocarbons, uses
(chlorofluorocarbons; nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT **Distillation**
(**extractive,** low-temp.; nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT Hydrocarbons, uses
(fluoro; nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT Semiconductor device fabrication
(nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT Hydrocarbons, uses
(nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT Perfluoro compounds
(nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT 76-16-4, Perfluoroethane
(PFC-116; nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT 75-73-0, Tetrafluoromethane
(PFC-14; nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT 76-19-7, Perfluoropropane
(PFC-218; nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT 74-84-0, Ethane, uses 74-85-1, Ethene, uses 74-87-3, HCC-40, uses 74-98-6, Propane, uses 75-10-5, HFC-32 75-45-6, HCFC-22 75-46-7, HFC-23 75-72-9, CFC-13 **76-15-3, CFC-115** 115-07-1, Propene, uses 124-38-9, Carbon dioxide, uses 353-36-6, HFC-161 **354-33-6, HFC-125** 420-46-2, HFC-143a 593-53-3, HFC-41 7647-01-0,

Hydrogen chloride, uses 10024-97-2, Dinitrogen oxide, uses
(nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)
IT 7783-54-2P, Nitrogen trifluoride
(nitrogen trifluoride gas purifn. by **azeotropic distn.** for electronics industry)

L18 ANSWER 4 OF 21 HCA COPYRIGHT 2004 ACS on STN
130:209425 Process for separation of **pentafluoroethane** by **extractive distillation.** Kohno, Satoru; Shibanuma, Takashi (Daikin Industries Ltd., Japan). PCT Int. Appl. WO 9910302 A1 19990304, 21 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (Japanese). CODEN: PIXXD2. APPLICATION: WO 1998-JP3590 19980812. PRIORITY: JP 1997-224989 19970821.
AB Claimed is a method for efficiently sepg. **pentafluoroethane** (**HFC-125**) from a mixt. thereof with **chloropentafluoroethane** (**CFC-115**). This method comprises subjecting a mixt. comprising **HFC-125** and **CFC-115** to **extractive distn.** to give highly concd. **HFC-125**, and a hydrofluorocarbon compd. having two carbon atoms, particularly 1,1,1,2-tetrafluoroethane, is used as an extractant to obtain concd. **CFC-115** as a **distillate** and a mixt. of **HFC-125** having a reduced content of **CFC-115** with the extractant as a bottom, the extractant being sepd. from **HFC-125** in this mixt. by **distn.** and reused in the **extractive distn**. The other preferred C2 hydrofluorocarbon extractant besides 1,1,1,2-tetrafluoroethane is 1,1-difluoroethane, 1,1,1-trifluoroethane, or 1,1,2,2-tetrafluoroethane. **HFC-125** is a Fron substitute and used as a refrigerant, foaming agent, and propellant.
IT **354-33-6P, HFC-125**
(process for sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3, CFC-115**
(process for sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

IC ICM C07C019-08
ICS C07C017-386
CC 23-3 (Aliphatic Compounds)
Section cross-reference(s): 45
ST **pentafluoroethane** sepn **extractive distn** ; hydrofluorocarbon extractant
IT **Distillation**
(**extractive**; process for sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT Hydrocarbons, uses
(fluoro, extractants; process for sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT 75-37-6, 1,1-Difluoroethane 359-35-3, 1,1,2,2-Tetrafluoroethane 420-46-2, 1,1,1-Trifluoroethane 811-97-2, 1,1,1,2-Tetrafluoroethane
(extractant; process for sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT **354-33-6P, HFC-125**
(process for sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT **76-15-3, CFC-115**
(process for sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

L18 ANSWER 5 OF 21 HCA COPYRIGHT 2004 ACS on STN

130:169822 Purification of difluoromethane by **extractive distillation.** Boehmer, Sara W.; Mahler, Barry Asher; Miller, Ralph Newton (E. I. Du Pont de Nemours & Co., USA). PCT Int. Appl. WO 9907660 A1 19990218, 30 pp. DESIGNATED STATES: W: JP, US; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US16689 19980812. PRIORITY: US 1997-55502 19970812.

AB The facile and economically attractive **extractive distn.** of difluoromethane from mixts. comprising it and ≥1 of chlorodifluoromethane, 1,1,1-trifluoroethane, **chloropentafluoroethane,** and **pentafluoroethane** using hydrocarbon (e.g., n-pentane), chlorocarbon (dichloromethane), and oxygen-contg. (e.g., EtOH) extractive agents is described. A process flow diagram is presented.

IT **76-15-3 354-33-6, Pentafluoroethane**
(purifn. of difluoromethane by **extractive distn** . from mixts. contg.)

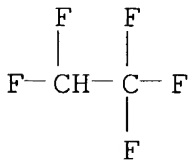
RN 76-15-3 HCA

CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-386
ICS C07C019-08

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 23, 48

ST difluoromethane **extractive distn**

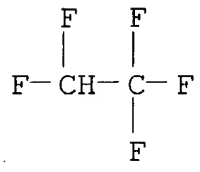
IT Alkanes, uses
Hydrocarbons, uses
(chloro, **extractive distn.** agents; purifn. of difluoromethane by **extractive distn.**)

IT Alcohols, uses
Alkanes, uses
Cycloalkanes
Ketones, uses
(**extractive distn.** agents; purifn. of difluoromethane by **extractive distn.**)

IT **Distillation**
(**extractive**; purifn. of difluoromethane by)
IT 64-17-5, Ethanol, uses 67-56-1, Methanol, uses 67-63-0, 2-Propanol, uses 67-64-1, Acetone, uses 71-23-8, 1-Propanol, uses 75-09-2, Dichloromethane, uses 78-93-3, Butanone, uses 96-14-0, 3-Methylpentane 96-37-7, Methylcyclopentane 107-83-5, 2-Methylpentane 109-66-0, n-Pentane, uses 110-54-3, n-Hexane, uses 110-82-7, Cyclohexane, uses 142-82-5, n-Heptane, uses 287-92-3, Cyclopentane
(**extractive distn.** agents; purifn. of difluoromethane by **extractive distn.**)
IT 75-10-5P, Difluoromethane
(purifn. of difluoromethane by **extractive distn**.)
IT 75-45-6, Chlorodifluoromethane **76-15-3 354-33-6, Pentafluoroethane** 420-46-2, 1,1,1-Trifluoroethane
(purifn. of difluoromethane by **extractive distn**. from mixts. contg.)

L18 ANSWER 6 OF 21 HCA COPYRIGHT 2004 ACS on STN
130:13761 Process for preparation of **pentafluoroethane** by **extractive distillation** using ethylene glycol compounds. Kohno, Satoru; Shibanuma, Takashi (Daikin Industries Ltd., Japan). PCT Int. Appl. WO 9852889 A1 19981126, 23 pp. DESIGNATED STATES: W: US; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (Japanese). CODEN: PIXXD2. APPLICATION: WO 1998-JP2170 19980518. PRIORITY: JP 1997-132059 19970522.
AB Described is a method by which **pentafluoroethane** (**HFC-125**) can be efficiently sepd. from a mixt. of **HFC-125** with **chloropentafluoroethane** (**CFC-115**). The process for prepg. high-concn. **HFC-125** by the **extractive distn**. of a mixt. of **HFC-125** with **CFC-115** comprises using an ethylene glycol compd. represented by the formula: R1O(CH2CH2O)nR2 (wherein R1 and R2 are each independently hydrogen or C1-C4 alkyl; and n is an integer of 1 to 3) as the extractant to obtain **CFC-115** as the **distillate** and a mixt. of **HFC-125** with the extractant as the bottom, recovering **HFC-125** from the mixt. through **distn.**, and reusing the **extractant** thus sepd. for the **extractive distn.**
IT **354-33-6P, Pentafluoroethane**
(process for prepn. of **pentafluoroethane** by **extractive distn.** using ethylene glycol compds.)
RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**
(process for prepn. of **pentafluoroethane** by **extractive distn.** using ethylene glycol compds.)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

IC ICM C07C019-08
ICS C07C017-386
CC 23-3 (Aliphatic Compounds)
ST **pentafluoroethane extractive distn;** ethylene glycol compd extractant; **chloropentafluoroethane pentafluoroethane extractive distn**
IT **Distillation**
(**extractive;** process for prepn. of **pentafluoroethane** by **extractive distn** . using ethylene glycol compds.)
IT Polyoxyalkylenes, uses
(process for prepn. of **pentafluoroethane** by **extractive distn.** using ethylene glycol compds.)
IT 107-21-1, Ethylene glycol, uses 111-77-3, Diethylene glycol monomethyl ether 25322-68-3, Poly(ethylene glycol)
(process for prepn. of **pentafluoroethane** by **extractive distn.** using ethylene glycol compds.)
IT **354-33-6P, Pentafluoroethane**
(process for prepn. of **pentafluoroethane** by **extractive distn.** using ethylene glycol compds.)
IT **76-15-3**
(process for prepn. of **pentafluoroethane** by **extractive distn.** using ethylene glycol compds.)

L18 ANSWER 7 OF 21 HCA COPYRIGHT 2004 ACS on STN

7.96

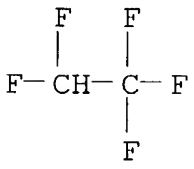
129:137608 Method for purifying **pentafluoroethane** by **extractive distillation** with perfluoroalkyl halides. Bertocchio, Rene; Lacroix, Eric; Perdrieux, Sylvain (Elf Atochem S. A., Fr.). Fr. Demande FR 2758137 A1 19980710, 11 pp. (French). CODEN: FRXXBL. APPLICATION: FR 1997-53 19970106.

AB **Chloropentafluoroethane** is removed from **pentafluoroethane** by subjecting the impure **pentafluoroethane** to **extractive distn.** using a perfluoroalkyl halide (e.g., n-perfluorohexyl chloride) as the extractive agent.

IT **354-33-6P, Pentafluoroethane**
(method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)

RN 354-33-6 HCA

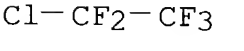
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**
(method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)

RN 76-15-3 HCA

CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C019-08
ICS C07C017-386

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 23, 48

ST **pentafluoroethane** purifn **extractive distn**; perfluoroalkyl halide extractant **pentafluoroethane** purifn; chloroperfluorohexane **extractant pentafluoroethane** purifn **extractive distn**

IT **Distillation**
(**extractive**; purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)

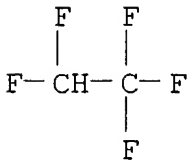
IT Perfluorocarbons
Perfluorocarbons
(halo; method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)

IT Perfluorocarbons
Perfluorocarbons
(iodo; method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)
IT Purification
(method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)
IT Alkyl chlorides
(perfluoro-; method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)
IT Alkyl halides
Alkyl halides
Alkyl iodides
Alkyl iodides
(perfluoro; method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)
IT 355-41-9, Perfluorohexyl chloride
(method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)
IT **354-33-6P, Pentafluoroethane**
(method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)
IT **76-15-3**
(method for purifying **pentafluoroethane** by **extractive distn.** with perfluoroalkyl halides)

L18 ANSWER 8 OF 21 HCA COPYRIGHT 2004 ACS on STN
128:272034 **Distillation** process and entraining agents for separating **pentafluoroethane** from **chloropentafluoroethane**. Clemmer, Paul Gene; Logsdon, Peter Brian; Pham, Hang Thanh (AlliedSignal Inc., USA). PCT Int. Appl. WO 9815511 A1 19980416, 13 pp. DESIGNATED STATES: W: AL, AU, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GE, GH, HU, ID, IL, IS, JP, KP, KR, LK, LR, LS, LT, LV, MG, MK, MN, MW, MX, NZ, PL, RO, RU, SD, SG, SI, SK, SL, TR, TT, UA, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1997-US18279 19971010. PRIORITY: US 1996-729264 19961010.
AB In the title process, a mixt. of **pentafluoroethane** and **chloropentafluoroethane** is contacted with an entraining agent (e.g., CH2F2, 1,1,1-trifluoroethane) to form an **azeotrope** of the entraining agent and **chloropentafluoroethane** and the **pentafluoroethane** is sepd. from the binary **azeotrope** of **chloropentafluoroethane** and entraining agent by **distn.** The **distn.** is conducted such that the **azeotrope** of **chloropentafluoroethane** and

entraining agent is removed as an overhead fraction and the **pentafluoroethane** is removed as a bottoms fraction.

IT **354-33-6P, Pentafluoroethane**
(**distn.** process and entraining agent for sepg. **pentafluoroethane** from **chloropentafluoroethane**)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

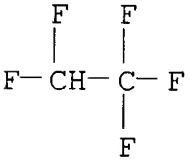


IT **76-15-3**
(**distn.** process and entraining agent for sepg. **pentafluoroethane** from **chloropentafluoroethane**)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

IC ICM C07C017-386
ICS C07C019-08
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 23, 48
ST **extractive distn pentafluoroethane** purifn; **azeotropic distn pentafluoroethane** purifn
IT **Distillation**
(**azeotropic; distn.** process and entraining agent for sepg. **pentafluoroethane** from **chloropentafluoroethane**)
IT **Distillation**
(**extractive; distn.** process and entraining agent for sepg. **pentafluoroethane** from **chloropentafluoroethane**)
IT **354-33-6P, Pentafluoroethane**
(**distn.** process and entraining agent for sepg. **pentafluoroethane** from **chloropentafluoroethane**)
IT **76-15-3**
(**distn.** process and entraining agent for sepg. **pentafluoroethane** from **chloropentafluoroethane**)
IT 75-10-5, Difluoromethane 420-46-2, 1,1,1-Trifluoroethane
(entraining agent; **distn.** process and entraining agent for sepg. **pentafluoroethane** from

chloropentafluoroethane)

L18 ANSWER 9 OF 21 HCA COPYRIGHT 2004 ACS on STN
127:307156 Purification of **pentafluoroethane** as refrigerant..
Tatematsu, Shin; Morikawa, Shinsuke (Asahi Glass Co., Ltd., Japan).
Jpn. Kokai Tokkyo Koho JP 09255597 A2 19970930 Heisei, 4 pp.
(Japanese). CODEN: JKXXAF. APPLICATION: JP 1996-66576 19960322.
AB C2HF5, useful as refrigerant (no data), is purified by contacting C2HF5 contg. C2F5Cl with CnHaF2n+2-a (I; n = 5-12; 0 ≤ a ≤ n + 2) or CnHbF2n-b (II; n = same as above; 0 ≤ b ≤ n + 1) and absorbing C2F5Cl by I or II to remove C2F5Cl. C2HF5 contg. 0.5 mol% C2F5Cl was fed into the bottom of concn. part of **extractive distn.** column, while C6H14 mixt. was fed into the bottom of solvent recovery part of the column at reflux ratio 10, a temp of the top of the column 33°, and bottom 75° under 6 kgG/cm2 to give 99.95% C2HF5 from the top of the column.
IT **354-33-6P, Pentafluoroethane**
(purifn. of **pentafluoroethane** by **extractive distn.** with fluorohydrocarbons)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

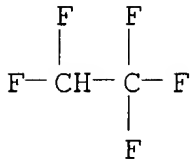


IT **76-15-3**
(removal of; purifn. of **pentafluoroethane** by **extractive distn.** with fluorohydrocarbons)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

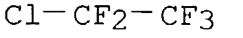
IC ICM C07C019-08
ICS C07C017-38
CC 23-3 (Aliphatic Compounds)
Section cross-reference(s): 48
ST fluoroethane purifn chlorofluoroethane removal; fluorohydrocarbon **extractive distn** chlorofluoroethane; refrigerant fluoroethane purifn
IT **Distillation**
(**extractive**; purifn. of **pentafluoroethane** by

extractive distn. with fluorohydrocarbons)
IT Hydrocarbons, uses
(fluoro; purifn. of **pentafluoroethane** by **extractive distn.** with fluorohydrocarbons)
IT Refrigerants
(purifn. of **pentafluoroethane** as refrigerant)
IT 355-04-4 355-42-0, Tetradecafluorohexane 865-71-4 85720-78-1 133452-70-7, Tridecafluorohexane
(purifn. of **pentafluoroethane** by **extractive distn.** with fluorohydrocarbons)
IT **354-33-6P, Pentafluoroethane**
(purifn. of **pentafluoroethane** by **extractive distn.** with fluorohydrocarbons)
IT **76-15-3**
(removal of; purifn. of **pentafluoroethane** by **extractive distn.** with fluorohydrocarbons)

L18 ANSWER 10 OF 21 HCA COPYRIGHT 2004 ACS on STN
126:185796 **Azeotropic** or **extractive distillation** processes for removing **chloropentafluoroethane** and hydrofluoric acid from **pentafluoroethane**. Miller, Ralph Newton; Mahler, Barry Asher; Nappa, Mario Joseph; Casey, Mark Andrew (E. I. Du Pont de Nemours & Co., USA; Miller, Ralph Newton; Mahler, Barry Asher; Nappa, Mario Joseph; Casey, Mark Andrew). PCT Int. Appl. WO 9703936 A1 19970206, 52 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1996-US11638 19960712. PRIORITY: US 1995-1156 19950714.
AB **Chloropentafluoroethane** (I) is removed from mixts. comprising I, difluoromethane, and **pentafluoroethane** (II), by **azeotropic** or **extractive distn.** for II purifn. Process flow diagrams and **distn.** product graphs are presented.
IT **354-33-6P, Pentafluoroethane**
(**azeotropic** or **extractive distn.** processes for removing **chloropentafluoroethane** and hydrofluoric acid from **pentafluoroethane**)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**
(**azeotropic** or **extractive distn.**
processes for removing **chloropentafluoroethane** and hydrofluoric acid from **pentafluoroethane**)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-386
ICS C07C017-38; C07C019-08; C07C019-12
CC 23-3 (Aliphatic Compounds)
Section cross-reference(s): 45, 48
ST fluoroethane purifn; **extractive distn** fluoroethane; **azeotropic distn** fluoroethane
IT **Distillation**
(**azeotropic**; for removing **chloropentafluoroethane** and hydrofluoric acid from **pentafluoroethane**)
IT **Distillation**
(**extractive**; for removing **chloropentafluoroethane** and hydrofluoric acid from **pentafluoroethane**)
IT 75-10-5, Difluoromethane
(**azeotropic** or **extractive distn.**
processes for removing **chloropentafluoroethane** and hydrofluoric acid from **pentafluoroethane**)
IT **354-33-6P, Pentafluoroethane**
(**azeotropic** or **extractive distn.**
processes for removing **chloropentafluoroethane** and hydrofluoric acid from **pentafluoroethane**)
IT **76-15-3**
(**azeotropic** or **extractive distn.**
processes for removing **chloropentafluoroethane** and hydrofluoric acid from **pentafluoroethane**)
IT 7664-39-3, Hydrogen fluoride, reactions
(**azeotropic** or **extractive distn.**
processes for removing **chloropentafluoroethane** and hydrofluoric acid from **pentafluoroethane**)

IT 7647-01-0, Hydrogen chloride, processes
(**azeotropic** or **extractive distn.**
processes for removing **chloropentafluoroethane** and
hydrofluoric acid from **pentafluoroethane**)

L18 ANSWER 11 OF 21 HCA COPYRIGHT 2004 ACS on STN
125:225775 Separating and removing fluorocarbon impurities from
1,1,1-trifluoroethane by **extractive distillation**
with **extractive** agent. Mahler, Barry Asher; Miller, Ralph
Newton (E. I. Du Pont de Nemours & Co., USA). PCT Int. Appl. WO
9623752 A1 19960808, 42 pp. DESIGNATED STATES: W: JP; RW: AT, BE,
CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English).
CODEN: PIXXD2. APPLICATION: WO 1996-US1431 19960131. PRIORITY: US
1995-382115 19950201.

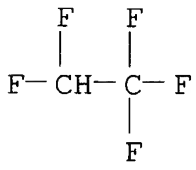
AB The extractive agent comprises an alc. selected from MeOH, BuOH,
EtOH, PrOH, and/or their isomers and cyclic compds. CF3CH3 is sepd.
from a 1st mixt. of CF3CH3 and C2ClF5 by adding ≥1 extractive
agent comprised of ≥1 alc. to the 1st mixt. to form a 2nd
mixt., sepg. C2ClF5 from the 2nd mixt. by **extractively**
distg. the 2nd mixt. in an **extractive**
distn. zone, forming a 3rd mixt. comprising the extractive
agent and CF3CH3 and optionally sepg. the extractive agent from the
3rd mixt., and recovering CF3CH3.

IT **76-15-3 354-33-6, Pentafluoroethane**
(sepg. and removing fluorocarbon impurities from trifluoroethane
by **extractive distn.** with **extractive**
agent)

RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-386
ICS C07C019-08; C07C019-12
CC 48-1 (Unit Operations and Processes)
Section cross-reference(s): 38, 66
ST impurity removal trifluoroethane alc extractive agent; methanol

extractive agent impurity removal trifluoroethane; ethanol
extractive agent impurity removal trifluoroethane; butanol
extractive agent impurity removal trifluoroethane; propanol
extractive agent impurity removal trifluoroethane;
chloropentafluoroethane impurity removal trifluoroethane alc

IT 64-17-5, Ethanol, uses 67-56-1, Methanol, uses 71-23-8, 1-Propanol, uses 71-36-3, 1-Butanol, uses
(sepg. and removing fluorocarbon impurities from trifluoroethane by **extractive distn.** with)

IT 420-46-2P, 1,1,1-Trifluoroethane
(sepg. and removing fluorocarbon impurities from trifluoroethane by **extractive distn.** with **extractive** agent)

IT 75-10-5, Difluoromethane 75-37-6, 1,1-Difluoroethane 75-45-6, Chlorodifluoromethane 75-68-3, 1-Chloro-1,1-difluoroethane 75-88-7, 2-Chloro-1,1,1-trifluoroethane **76-15-3** **354-33-6, Pentafluoroethane** 430-66-0, 1,1,2-Trifluoroethane 811-97-2, 1,1,1,2-Tetrafluoroethane
(sepg. and removing fluorocarbon impurities from trifluoroethane by **extractive distn.** with **extractive** agent)

IT 74-84-0, Ethane, processes
(sepg. and removing impurities from trifluoroethane by **extractive distn.** with **extractive** agent)

L18 ANSWER 12 OF 21 HCA COPYRIGHT 2004 ACS on STN
125:225077 Purification of **pentafluoroethane** containing **chloropentafluoroethane.** Guiraud, Emmanuel; Descamps, Cathy (Elf Atochem S.A., Fr.). PCT Int. Appl. WO 9624569 A1 19960815, 20 pp. DESIGNATED STATES: W: AU, CA, CN, JP, KR, US; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (French). CODEN: PIXXD2. APPLICATION: WO 1996-FR196 19960206. PRIORITY: FR 1995-1381 19950207.

AB The purifn. involves sepg. HCF2CF3 from ClCF2CF3 by liq.-liq. **extn.** or **extractive distn.** with Cl2C:CCl2 as the extractive agent.

IT **354-33-6P, Pentafluoroethane**
(purifn. by removal of **chloropentafluoroethane** by **extn.** and **distn.**)

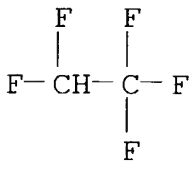
RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

IT **76-15-3P 354-33-6P, Pentafluoroethane**
(purifn. of **pentafluoroethane** by **extractive distn.**)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

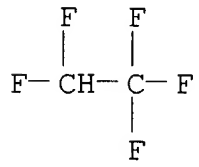


IC ICM C07C017-386
ICS C07C019-08; C07C019-12
CC 23-3 (Aliphatic Compounds)
Section cross-reference(s): 45, 48
ST **pentafluoroethane** purifn **extractive distn**
IT Perfluorocarbons
(purifn. of **pentafluoroethane** by **extractive distn.** using)
IT Polyethers, uses
(perfluoro, purifn. of **pentafluoroethane** by **extractive distn.** using)
IT Fluoropolymers
(polyether-, purifn. of **pentafluoroethane** by **extractive distn.** using)
IT 151-67-7 678-26-2, Perfluoropentane
(purifn. of **pentafluoroethane** by **extractive distn.**)
IT **76-15-3P 354-33-6P, Pentafluoroethane**
(purifn. of **pentafluoroethane** by **extractive distn.**)

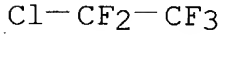
L18 ANSWER 15 OF 21 HCA COPYRIGHT 2004 ACS on STN
124:260361 Preparation of **pentafluoroethane.** Kono, Sei; Shibanuma, Takashi (Daikin Ind Ltd, Japan). Jpn. Kokai Tokkyo Koho JP 08003082 A2 19960109 Heisei, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1994-193066 19940817. PRIORITY: JP 1994-81397 19940420.
AB The process consists of **extractive distn.** of

mixts. contg. **pentafluoroethane** (I) and **chloropentafluoroethane** (II) with mixed solvents contg. (1) C1-4 alcs., C3-7 ketones, C2-6 ethers, and/or MeNO2 and (2) C3-8 hydrocarbons, ClCH:CCl2, and/or CCl4, and sepn. of I- and the solvent-contg. mixts. as bottom products or I-contg. mixts. as **distillates**. A mixt. contg. I and II was **extractive distd.** by MeOH at 45°, reflux ratio 200 and 7 kg/cm2-gage to give bottom products contg. I and MeOH, which were **distd.** at reflux ratio 10 and 5 kg/cm2-gage to recover 89% I.

IT **354-33-6P, Pentafluoroethane**
(sepn. of **pentafluoroethane** from chloropentafluroethane mixt. by **extractive distn.**)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**
(sepn. of **pentafluoroethane** from chloropentafluroethane mixt. by **extractive distn.**)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C019-08
ICS C07C017-386
CC 23-3 (Aliphatic Compounds)
ST fluoroethane sepn **extractive distn;** **chloropentafluoroethane** removal alc extn solvent; ketone extn solvent **chloropentafluoroethane** removal; ether extn solvent **chloropentafluoroethane** removal; nitromethane extn solvent **chloropentafluoroethane** removal; hydrocarbon extn solvent **chloropentafluoroethane** removal; chloroethylene extn solvent **chloropentafluoroethane** removal; carbon tetrachloride extn **chloropentafluoroethane** removal
IT Ligroine
(sepn. of **pentafluoroethane** from chloropentafluroethane mixt. by **extractive distn.**)
IT Alcohols, uses
(C1-4, sepn. of **pentafluoroethane** from

chloropentafluroethane mixt. by **extractive distn.**)

IT Ethers, uses
(C2-6, sepn. of **pentafluoroethane** from chloropentafluroethane mixt. by **extractive distn.**)

IT Ketones, uses
(C3-7, sepn. of **pentafluoroethane** from chloropentafluroethane mixt. by **extractive distn.**)

IT Hydrocarbons, uses
(C3-8, sepn. of **pentafluoroethane** from chloropentafluroethane mixt. by **extractive distn.**)

IT 56-23-5, Carbon tetrachloride, uses 60-29-7, Diethyl ether, uses 67-56-1, Methanol, uses 67-64-1, Acetone, uses 75-52-5, Nitromethane, uses 79-01-6, Trichloroethylene, uses 111-65-9, n-Octane, uses 287-92-3, Cyclopentane
(sepn. of **pentafluoroethane** from chloropentafluroethane mixt. by **extractive distn.**)

IT **354-33-6P, Pentafluoroethane**
(sepn. of **pentafluoroethane** from chloropentafluroethane mixt. by **extractive distn.**)

IT **76-15-3**
(sepn. of **pentafluoroethane** from chloropentafluroethane mixt. by **extractive distn.**)

L18 ANSWER 16 OF 21 HCA COPYRIGHT 2004 ACS on STN
123:290391 Separating **pentafluoroethane** from **chloropentafluoroethane** by **extractive distillation.** Mahler, Barry Asher; Miller, Ralph Newton (du Pont de Nemours, e. I., and Co., USA). PCT Int. Appl. WO 9521148 A1 19950810, 41 pp. DESIGNATED STATES: W: JP; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1995-US1191 19950206. PRIORITY: US 1994-192664 19940207; US 1995-378349 19950201.

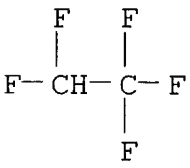
AB O3-protective **pentafluoroethane HFC-125** is sepd. by **extractive distn.** from a mixt. comprising **pentafluoroethane**, 1,1,1-trifluoroethane HFC-143a, and **chloropentafluoroethane CFC-115** by using alcs. such as MeOH, EtOH, among others, as the extractive agents, forming an **HFC-125**-contg. **azeotrope** in a staged **extractive distn.** process.

IT **76-15-3**
(**CFC-115**; sepg. **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

IT **354-33-6P, Pentafluoroethane**
(**HFC-125**; sepg. **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-386
ICS C07C019-08
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 48
ST **pentafluoroethane HFC125** purifn **extractive distn; HFC125 CFC115** HFC143a sepn **extractive distn**
IT **Distillation**
(**extractive, azeotropic**; sepg. **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT **76-15-3**
(**CFC-115**; sepg. **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT **354-33-6P, Pentafluoroethane**
(**HFC-125**; sepg. **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT 71-55-6, 1,1,1-Trichloroethane
(HFC-143a; sepg. **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT 64-17-5, Ethanol, uses 67-56-1, Methanol, uses 67-63-0, Isopropanol, uses 71-23-8, n-Propanol, uses 75-65-0, tert-Butanol, uses 78-92-2, sec-Butanol
(extractive agents; sepg. **pentafluoroethane** from **chloropentafluoroethane** by **extractive**

distn.)

L18 ANSWER 17 OF 21 HCA COPYRIGHT 2004 ACS on STN
123:290390 Separation of **pentafluoroethane** from halogenated hydrocarbons and **chloropentafluoroethane** by **extractive distillation.** Mahler, Barry Asher; Miller, Ralph Newton (du Pont de Nemours, E. I., and Co., USA). PCT Int. Appl. WO 9521147 A1 19950810, 25 pp. DESIGNATED STATES: W: JP; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1995-US1186 19950206. PRIORITY: US 1994-192663 19940207.

AB O3-protective **pentafluoroethane** is sepd. from mixts. with **chloropentafluoroethane** by **extractive distn.** using hydrochlorocarbons, hydrocarbons, and chlorocarbons as extractive agents.

IT **76-15-3**
(**CFC-115**; sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

RN 76-15-3 HCA

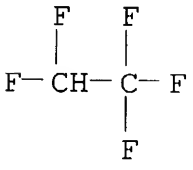
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

IT **354-33-6P, Pentafluoroethane**
(**HFC-125**; sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-386
ICS C07C019-08

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 48

ST pentachloroethane **HFC125** purifn **extractive distn; HFC125 CFC115** sepn **extractive distn**

IT Hydrocarbons, uses
Perchlorocarbons

(extractive agents; sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

IT Hydrocarbons, uses
(chloro, extractive agents; sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

IT **76-15-3**
(**CFC-115**; sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

IT **354-33-6P, Pentafluoroethane**
(**HFC-125**; sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

IT 71-55-6, Methylchloroform 75-34-3, 1,1-Dichloroethane 79-01-6, Trichloroethylene, uses 107-06-2, 1,2-Dichloroethane, uses 109-66-0, n-Pentane, uses 110-54-3, n-Hexane, uses 111-65-9, n-Octane, uses 127-18-4, Perchloroethylene, uses 142-82-5, n-Heptane, uses
(extractive agents; sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

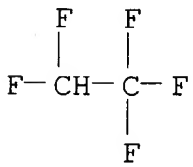
L18 ANSWER 18 OF 21 HCA COPYRIGHT 2004 ACS on STN
123:256156 Process for the purification of **pentafluoroethane.**
Bertocchio, Rene; Lacues, Philippe; Lantz, Andre (Elf Atochem S.A., Fr.). Eur. Pat. Appl. EP 669302 A1 19950830, 9 pp. DESIGNATED STATES: R: BE, DE, ES, FR, GB, GR, IT, NL. (French). CODEN: EPXXDW. APPLICATION: EP 1995-400125 19950123. PRIORITY: FR 1994-2114 19940224.

AB The title process for the purifn. of **pentafluoroethane** contg. **chloropentafluoroethane** comprises **extractive distn.** using a (cyclo)alkane as extractant.

IT **354-33-6P, Pentafluoroethane**
(process for the purifn. of **pentafluoroethane**)

RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**

(process for the purifn. of **pentafluoroethane**)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

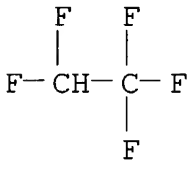
IC ICM C07C017-38
ICS C07C019-08
CC 23-3 (Aliphatic Compounds)
ST **pentafluoroethane** purifn; **chloropentafluoroethane** removal **pentafluoroethane extractive distn**
IT 78-78-4, Isopentane 107-83-5, Isohexane 109-66-0, Pentane, uses 110-54-3, Hexane, uses 110-82-7, Cyclohexane, uses 287-92-3, Cyclopentane
(process for the purifn. of **pentafluoroethane**)
IT **354-33-6P, Pentafluoroethane**
(process for the purifn. of **pentafluoroethane**)
IT **76-15-3**
(process for the purifn. of **pentafluoroethane**)

L18 ANSWER 19 OF 21 HCA COPYRIGHT 2004 ACS on STN
122:136762 **Azeotropic** and **azeotrope**-like compositions and a process for separating hydrochloric acid and halocarbons. Mahler, Barry Asher; Felix, Vinci Martinez; Miller, Ralph Newton (du Pont de Nemours, E. I., and Co., USA). PCT Int. Appl. WO 9425419 A1 19941110, 39 pp. DESIGNATED STATES: W: JP; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1994-US4301 19940425. PRIORITY: US 1993-55486 19930430; US 1994-208256 19940309.
AB The process for sepg. HCl from a 1st mixt. comprising HCl and ≥1 halocarbon selected from **pentafluoroethane**, chlorotrifluoromethane, trifluoromethane and **chloropentafluoroethane** comprises adding a fluorocarbon, chlorofluorocarbon or chlorocarbon extractive agent having 1-5 carbon atoms, either satd. or unsatd., optionally including H, and having b.p. at atm. pressure greater than about -48° and less than about 120°, to the 1st mixt. in order to form a resultant 2nd mixt.; and sepg. HCl from the halocarbon of the 2nd mixt. by **extractively distg.** the 2nd mixt. in an **extractive distn.** zone and recovering HCl substantially free of halocarbon.
IT **76-15-3, CFC 115 354-33-6, HFC 125**
(**extractive** agent; **azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)

RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-38
ICS C07C019-08
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
IT **Azeotropes** and **Azeotropy**
(**azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)
IT Hydrocarbons, uses
(chloro, **extractive** agent; **azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)
IT Hydrocarbons, uses
(chloro fluoro, **extractive** agent; **azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)
IT Hydrocarbons, uses
(fluoro, **extractive** agent; **azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)
IT Hydrocarbons, preparation
(halo, **azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)
IT 7647-01-0P, Hydrogen chloride, preparation
(**azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)
IT 75-46-7, Trifluoromethane 27987-06-0, Trifluoroethane
(**azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)
IT 1330-45-6, Chlorotrifluoroethane
(**azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)
IT 76-14-2, CFC 114 **76-15-3, CFC 115**
306-83-2, HCFC 123 **354-33-6, HFC 125**

1320-37-2, Dichlorotetrafluoroethane 2837-89-0, HCFC 124
63938-10-3, Chlorotetrafluoroethane
(**extractive** agent; **azeotropic** and **azeotrope**-like compns. and a process for sepg. HCl and halocarbons)

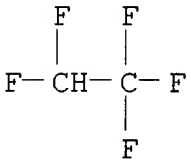
L18 ANSWER 20 OF 21 HCA COPYRIGHT 2004 ACS on STN
122:105242 Purification of **pentafluoroethane** from **chloropentafluoroethane** byproducts using **extractive distillation**. Nishimura, Atsuo; Takahashi, Reiji (Showa Denko K. K., Japan). Eur. Pat. Appl. EP 626362 A1 19941130, 7 pp. DESIGNATED STATES: R: BE, DE, ES, FR, GB, GR, IT, NL, PT. (English). CODEN: EPXXDW. APPLICATION: EP 1994-108091 19940525. PRIORITY: JP 1993-122869 19930525.

AB **Extractive distn.** of **pentafluoroethane** (I) from a crude mixt. contg. **chloropentafluoroethane** (II) as a byproduct using an extg. reagent having a std. b.p. between -10° and 100°C is described. Possible extg. agents include paraffinic hydrocarbons, alcs., ethers, esters, and ketones. Thus, crude I contg. 2.9 mol% II was purified by **extractive distn.** using pentane to give a **distillate** contg. 99.93% I.

IT **354-33-6P, Pentafluoroethane**
(sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

RN 354-33-6 HCA

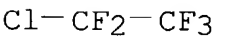
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**
(sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

RN 76-15-3 HCA

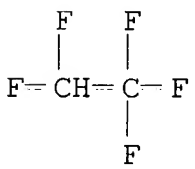
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



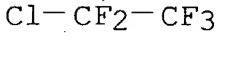
IC ICM C07C017-38
ICS C07C019-08

CC 23-3 (Aliphatic Compounds)
ST **extractive distn pentafluoroethane chloropentafluoroethane**; sepn **pentafluoroethane chloropentafluoroethane extractive distn** ; purifn **pentafluoroethane chloropentafluoroethane extractive distn**; **HFC125 extractive distn CFC115**
IT 60-29-7, Diethyl ether, uses 64-17-5, Ethanol, uses 67-56-1, Methanol, uses 67-63-0, Isopropanol, uses 67-64-1, Acetone, uses 71-23-8, 1-Propanol, uses 78-78-4, Isopentane 78-93-3, Methyl ethyl ketone, uses 79-20-9, Methyl acetate 109-66-0, Pentane, uses 109-94-4, Ethyl formate 110-54-3, Hexane, uses 141-78-6, Ethyl acetate, uses
(sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT **354-33-6P, Pentafluoroethane**
(sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)
IT **76-15-3**
(sepn. of **pentafluoroethane** from **chloropentafluoroethane** by **extractive distn.**)

L18 ANSWER 21 OF 21 HCA COPYRIGHT 2004 ACS on STN
116:196598 Process for separating **pentafluoroethane** from a mixture of halogenated hydrocarbons containing **chloropentafluoroethane**. Felix, Vinci M. (du Pont de Nemours, E. I., and Co., USA). U.S. US 5087329 A 19920211, 4 pp. (English). CODEN: USXXAM. APPLICATION: US 1991-714374 19910516.
AB F3CCF2H (I) is sepd. from its mixt. with F3CCF2Cl (II) by adding a C1-4 fluorocarbon extractive agent (e.g., ClF2CCF2Cl), optionally contg. H and/or Cl, and having b.p. greatyer than 39° but less than about 50°, to the mixt., and then recovering, by **extractive distn.**, a I stream free of II.
IT **354-33-6, Pentafluoroethane**
(mixt. with **chloropentafluoroethane**, sepn. of, **extractive distn.** for)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**
(mixt. with **pentafluoroethane**, sepn. of, **extractive distn.** for)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM B01D003-40
ICS C07C017-38
NCL 203067000
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
ST **pentafluoroethane** sepn **chloropentafluoroethane**; **extractive distn** sepn pentfluoroethane; refrigerant ozone layer protection
IT Propellants
(**pentafluoroethane**, prepn. of, **extractive distn.** from **chloropentafluoroethane** for)
IT Refrigeration
(agents, **pentafluoroethane**, prepn. of, **extractive distn.** from **chloropentafluoroethane** for)
IT 75-69-4, Trichlorofluoromethane 76-13-1 76-14-2, 1,2-Dichlorotetrafluoroethane 115-25-3, Octafluorocyclobutane 306-83-2, 2,2-Dichloro-1,1,1-trifluoroethane 354-58-5, 1,1,1-Trichlorotrifluoroethane 374-07-2, 1,1-Dichlorotetrafluoroethane 2837-89-0, 2-Chloro-1,1,1,2-tetrafluoroethane
(**extractive** agent, for **distn.** sepn. of **pentafluoroethane/chloropentafluoroethane** mixt.)
IT **354-33-6, Pentafluoroethane**
(mixt. with **chloropentafluoroethane**, sepn. of, **extractive distn.** for)
IT **76-15-3**
(mixt. with **pentafluoroethane**, sepn. of, **extractive distn.** for)

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L19 ANSWER 1 OF 15 HCA COPYRIGHT 2004 ACS on STN
136:87509 Parallel fluorination process for the preparation of **pentafluoroethane** from perchloroethylene. Cerri, Gustavo; Basu, Rajat S.; Richards, Jeffrey Charles; Stuck, Jason Thomas; Tung, Hsueh Sung; Patty, Jay Bradley; Cottrell, Stephen Alan

(Honeywell International Inc., USA). PCT Int. Appl. WO 2002002492 A2 20020110, 32 pp. DESIGNATED STATES: W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-US20442 20010627. PRIORITY: US 2000-608539 20000630.

AB A process which achieves improved selectively of **pentafluoroethane** and/or an improved HFC/HCFC ratio (and particularly **HFC-125/CFC-115** ratio) by a fluorination process is described which comprises reacting polychlorinated ethylenes (e.g., tetrachloroethylene) and HF in a first reaction train to produce a reaction product comprising at least HCFC-124 (e.g., chlorotetrafluoroethylene), sepg. from this reaction product a portion of the HCFC-124, and reacting the sepd. HCFC-124 with HF in a second reaction train to produce a second reaction product contg. **pentafluoroethane** . Process flow diagrams are presented.

IT **76-15-3P**
(in a parallel fluorination process for the prepn. of **pentafluoroethane** from perchloroethylene)

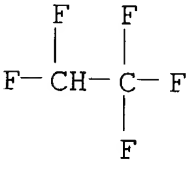
RN 76-15-3 HCA

CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

IT **354-33-6P, Pentafluoroethane**
(parallel fluorination process for the prepn. of **pentafluoroethane** from perchloroethylene)

RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C019-08
ICS C07C017-21; C07C017-20

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 23, 48

ST **pentafluoroethane** manuf fluorination perchloroethylene; **distn pentafluoroethane** manuf fluorination perchloroethylene

IT **Distillation**
(in a fluorination parallel process for the prepn. of **pentafluoroethane**)

IT Fluorination
(parallel process for the prepn. of **pentafluoroethane**)

IT **76-15-3P**
(in a parallel fluorination process for the prepn. of **pentafluoroethane** from perchloroethylene)

IT 34077-87-7, Dichlorotrifluoroethane 63938-10-3, Chlorotetrafluoroethane
(in a parallel fluorination process for the prepn. of **pentafluoroethane** from perchloroethylene)

IT **354-33-6P, Pentafluoroethane**
(parallel fluorination process for the prepn. of **pentafluoroethane** from perchloroethylene)

IT 127-18-4, Perchloroethylene, reactions
(parallel fluorination process for the prepn. of **pentafluoroethane** from perchloroethylene)

IT 7664-39-3, Hydrogen fluoride, reactions
(parallel fluorination process for the prepn. of **pentafluoroethane** from perchloroethylene and)

L19 ANSWER 2 OF 15 HCA COPYRIGHT 2004 ACS on STN

133:32223 Wet compression versus dry compression in heat pumps working with pure refrigerants or non-**azeotropic** binary mixtures for different heating applications. Vorster, P. P. J.; Meyer, J. P. (Research Group for Cooling and Heating Technology, Department of Mechanical Engineering, Laboratory for Energy, Rand Afrikaans University, Auckland Park, 2006, S. Afr.). International Journal of Refrigeration, 23(4), 292-311 (English) 2000. CODEN: IJRFDI. ISSN: 0140-7007. Publisher: Elsevier Science Ltd..

AB Wet compression vs. dry compression in heat pumps working with pure refrigerants or non-**azeotropic** binary mixts. is investigated in this paper. In total 34 pure refrigerants and 31 non-**azeotropic** binary mixts. at different concns. are considered. This resulted in approx. 300 different mixts. being analyzed. The pure refrigerants were analyzed for three different heating applications found in practice: the heating of swimming pool water, heating air for interior space heating, and the heating of water for domestic use. The investigation was conducted with cycle analyses calcg. performances at different wet and dry compressor inlet values. Use was made of thermodn. refrigerant properties calcd. from a computer database. For both pure and non-**azeotropic** refrigerants analyzed, all those with re-entrant satn. vapor lines produce better heating COP's when the refrigerant

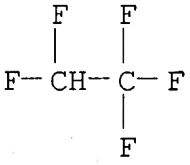
is superheated before entering the compressor. Only a few of the refrigerants with bell-shaped T-s curves consistently produce higher heating COP's when wet compression is used. However, their heating capacities decrease while the compressor displacement rates increase. It was concluded that in general dry compression is more favorable than wet compression. From the few exceptions that do exist, some manage to produce very high COPh's while retaining competitive heating capacities. A byproduct of this study is that from the vast amt. of refrigerant mixts. analyzed valuable knowledge was gathered regarding refrigerants not commonly used in the applications considered.

IT **76-15-3**, R115 **354-33-6**, R125
(wet compression vs. dry compression in heat pumps working with pure refrigerants or non-**azeotropic** binary mixts.)

RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



CC 48-5 (Unit Operations and Processes)

IT Mixtures
(binary; wet compression vs. dry compression in heat pumps working with pure refrigerants or non-**azeotropic** binary mixts.)

IT Compression
Heat pumps
Refrigerants
(wet compression vs. dry compression in heat pumps working with pure refrigerants or non-**azeotropic** binary mixts.)

IT Air conditioning
(wet compression vs. dry compression in heat pumps working with pure refrigerants or non-**azeotropic** binary mixts. for heating of air)

IT Swimming pools
(wet compression vs. dry compression in heat pumps working with pure refrigerants or non-**azeotropic** binary mixts. for heating of swimming pool water)

IT 74-98-6, R290, processes 75-10-5, R32, Refrigerant 75-19-4, RC270 75-37-6, R152a 75-43-4, R21, Refrigerant 75-45-6 75-63-8, R13B1 75-68-3, R142b 75-69-4, R11, Refrigerant 75-71-8, R12, Refrigerant 76-13-1, R113 76-14-2, R114 **76-15-3**, R115 76-19-7, R218 106-97-8, R600, processes 115-25-3, RC318 354-23-4, R123a **354-33-6**, R125 359-35-3, R134 420-46-2, R143a 430-66-0, R143 431-63-0, R236Ea 431-89-0, R227Ea 811-97-2, R134a 1717-00-6, R141b 1814-88-6, R245Cb 2837-89-0, R124 7664-41-7, Ammonia, processes 109207-22-9, E134
(wet compression vs. dry compression in heat pumps working with pure refrigerants or non-**azeotropic** binary mixts.)

IT 7732-18-5, Water, processes
(wet compression vs. dry compression in heat pumps working with pure refrigerants or non-**azeotropic** binary mixts. for heating of water)

L19 ANSWER 3 OF 15 HCA COPYRIGHT 2004 ACS on STN

130:43616 Procedure for estimating the effects of impurities on measured vapor pressures. Weber, L. A.; Defibaugh, D. R. (Chemical Science and Technology Laboratory, Physical and Chemical Properties Division, National Institute of Standards and Technology, Gaithersburg, MD, 20899, USA). Fluid Phase Equilibria, 150, 151, 731-738 (English) 1998. CODEN: FPEQDT. ISSN: 0378-3812. Publisher: Elsevier Science B.V..

AB A thermodn. relationship is used to describe how the presence of an impurity affects measured vapor pressures by relating the effect to the distribution coeff., K, of the impurity. In practical situations K is estd. simply by anal. with a gas chromatograph. A second relationship is used to describe how K, and thus the effect, varies with temp. The effect of **azeotropic** behavior on the temp. variation is also considered. Several examples are given, including the systems CH2F2 + CF3CH2F (HFC32 + HFC134a), CF3CF2Cl + CF3CHF2 (HCFC115 + CFC125), CHF2CF2CH2F + CF3CF2CF2CH2F (HFC245ca + HFC338mccq), and samples of CF3CH2CF3 (HFC236fa) and n-heptane with impurities.

IT **76-15-3 354-33-6**
(estg. effects of impurities on measured vapor pressures)

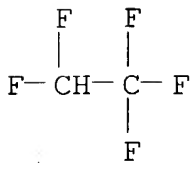
RN 76-15-3 HCA

CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



CC 65-6 (General Physical Chemistry)
Section cross-reference(s): 68, 69

IT **Azeotropes**
Impurities
Partition
Refrigerants
Thermodynamics
Vapor pressure
(estg. effects of impurities on measured vapor pressures)

IT 75-10-5 **76-15-3** 142-82-5, n-Heptane, properties
354-33-6 662-35-1 679-86-7, HFC245ca 690-39-1, HFC236fa 811-97-2, HFC134a
(estg. effects of impurities on measured vapor pressures)

L19 ANSWER 4 OF 15 HCA COPYRIGHT 2004 ACS on STN
126:80290 A relationship between dynamic viscosity and reduced temperature of refrigerant fluids and their mixtures in the liquid phase. Latini, Giovanni; Passerini, Giorgio; Polonara, Fabio (Dipartimento di Energetica, Universita di Ancona, Via Brecce Bianche, I-60100, Ancona, Italy). Fluid Phase Equilibria, 125(1-2, 4th Asian Thermophysical Properties Conference, 1995), 205-217 (English) 1996. CODEN: FPEQDT. ISSN: 0378-3812. Publisher: Elsevier.

AB A prediction method relating dynamic viscosity with reduced temp. is proposed in this paper for pure and mixed refrigerant fluids in the liq. state along the satn. line. The validity of the method is checked by comparison with dynamic viscosity data available in literature. Comparison results are reported for many halocarbon refrigerants and for bis(difluoromethyl)ether (RE134) as well. Some exptl. data for **azeotropic** and non-**azeotropic** binary mixts. have also been compared with the dynamic viscosity predicted with the present method and a simple mixing rule. The results of the comparisons give av. abs. deviations and max. abs. deviations compatible with engineering applications.

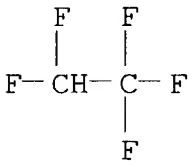
IT **76-15-3**, R115 **354-33-6**, R125
(relationship between dynamic viscosity and reduced temp. of refrigerant fluids and their mixts. in liq. phase)

RN 76-15-3 HCA

CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



CC 65-6 (General Physical Chemistry)
Section cross-reference(s): 48, 68
IT **Azeotropes**
Liquid mixtures
Refrigerants
Viscosity
(relationship between dynamic viscosity and reduced temp. of refrigerant fluids and their mixts. in liq. phase)
IT 56-23-5, properties 67-66-3, R20, properties 74-87-3, R40, properties 75-00-3, R160 75-09-2, R30, properties 75-10-5 75-37-6, R152a 75-43-4, R21 75-45-6 75-46-7 75-63-8, R13B1 75-68-3, R142b 75-69-4 75-71-8 75-72-9, R13 75-88-7, R133a 76-13-1, R113 76-14-2, R114 **76-15-3**, R115 306-83-2, R123 354-23-4, R123a **354-33-6**, R125 420-46-2, R143a 593-70-4, R31 811-97-2, R134a 1691-17-4, RE134 1717-00-6, R141b 2837-89-0, R124
(relationship between dynamic viscosity and reduced temp. of refrigerant fluids and their mixts. in liq. phase)

L19 ANSWER 5 OF 15 HCA COPYRIGHT 2004 ACS on STN
125:86171 Purification process for hexafluoroethane products by **azeotropic distillation** with hydrogen chloride.
Miller, Ralph Newton; Deschere, Mark Richard; Mahler, Barry Asher; Muthu, Olagappan (E. I. Du Pont de Nemours & Co., USA). PCT Int. Appl. WO 9609271 A1 19960328, 75 pp. DESIGNATED STATES: W: AM, AU, BB, BG, BR, BY, CA, CN, CZ, EE, FI, GE, HU, IS, JP, KG, KP, KR, KZ, LK, LR, LT, LV, MD, MG, MK, MN, MX, NO, NZ, PL, RO, RU, SG, SI, SK, TJ, TM, TT, UA, UZ, VN; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1995-US11053 19950913. PRIORITY: US 1994-309376 19940920.
AB The disclosure relates to removing impurities from hexafluoroethane (CF3CF3), also known as Perfluorocarbon 116 (PFC-116) or Fluorocarbon 116 (FC-116), by using **azeotropic distn.** such that an overhead product consisting essentially

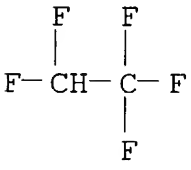
of HCl-hexafluoroethane if formed, optionally combined with a phase sepn. step to break the HCl-hexafluoroethane **azeotropic** or **azeotrope**-like compn. thereby permitting recovery of substantially pure hexafluoroethane. Unreacted hydrogen fluoride (HF) may be removed from hexafluoroethane during the above **azeotropic distn.** with HCl or alternatively by an **azeotropic distn.** wherein an HF-hexafluoroethane **azeotropic** or **azeotrope**-like compn. exits overhead and substantially pure HF exits in the bottoms stream. Thus, 250 lb/h of anhyd. HCl was added to a feed stream contg. 500 lb/h of PFC-116 and 0.5 lb/h of chlorotrifluoromethane (CFC-13). The feed stream was introduced onto stage 41 of a **distn.** column with 62 stages at -30° with the column condenser pressure 264.7 psia and the column phase pressure 3 psia higher. The **distn.** was carried out at reflux ratio 16.4, the **distillate**/feed ratio 0.92, the **distillate** temp. -27°, and the bottom column temp. -26° to -21° to give 495 lb/h PFC-116 contg. 1.0 ppm CFC-13 with 99% recovery in an overhead product. The PFC-116 and **azeotroped** HCl were then cooled to <-50° and the two layers sepd. in a decanter. The PFC-116 layer was then sent to a second **distn.** column for removing remaining HCl as an overhead **azeotrope.** The recovered HCl may be recycled to the first **distn.** column.

IT **76-15-3, CFC-115 354-33-6, HFC-125**
(purifn. of hexafluoroethane products by **azeotropic distn.** with hydrogen chloride)

RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-386
ICS C07C017-20; C07C017-38; C07C019-08

CC 23-3 (Aliphatic Compounds)

ST hexafluoroethane purifn **azeotropic distn**
hydrogen chloride; hydrogen chloride hexafluoroethane

azeotrope

IT **Azeotropes** and **Azeotropy**
(hexafluoroethane-hydrochloric acid; purifn. of hexafluoroethane products by **azeotropic distn.** with hydrogen chloride)

IT 7647-01-0, Hydrogen chloride, uses
(purifn. of hexafluoroethane products by **azeotropic distn.** with hydrogen chloride)

IT 76-16-4P, Hexafluoroethane
(purifn. of hexafluoroethane products by **azeotropic distn.** with hydrogen chloride)

IT 75-10-5, HFC-32 75-37-6, 1,1-Difluoroethane 75-45-6, HCFC-22 75-46-7, HFC-23 75-72-9, Chlorotrifluoromethane 76-13-1, CFC-113 76-14-2, CFC-114 **76-15-3, CFC-115** **354-33-6, HFC-125** 354-58-5, CFC-113a 374-07-2, CFC-114a 420-46-2, 1,1,1-Trifluoroethane 7664-39-3, Hydrogen fluoride, processes
(purifn. of hexafluoroethane products by **azeotropic distn.** with hydrogen chloride)

L19 ANSWER 6 OF 15 HCA COPYRIGHT 2004 ACS on STN

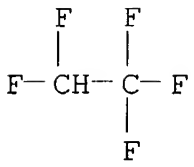
124:346544 Purification of **pentafluoroethane.** Ewing, Paul Nicholas; Goodyear, Gary; Fitchett, Mark; Forsyth, James Malcolm (Imperial Chemical Industries Plc, UK). PCT Int. Appl. WO 9606063 A1 19960229, 14 pp. DESIGNATED STATES: W: CA, CN, JP, KR, MX, US; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1995-GB1873 19950808. PRIORITY: GB 1994-17118 19940824.

AB A process for purifn. of **pentafluoroethane** by removing **chloropentafluoroethane** therefrom comprises contacting the impure **pentafluoroethane** in the gas phase with a liq., polar org. compd. extractant, preferably by countercurrent flow through a column, to form a liq. phase contg. **pentafluoroethane** and recovering essentially pure **pentafluoroethane** from the liq. phase, preferably by simple **distn.** under reflux conditions. The liq., polar org. compd. may be an oxygen- and/or nitrogen-contg. compd. or a halogenated hydrocarbon.

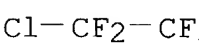
IT **354-33-6P, HFC 125**
(purifn. of **pentafluoroethane**)

RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3, CFC 115**
(purifn. of **pentafluoroethane** by using extractants)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-38
ICS C07C019-08; C07C019-12
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
ST **pentafluoroethane** purifn extractant; **distn** **pentafluoroethane** purifn
IT **Distillation**
(purifn. of **pentafluoroethane** by using extractants)
IT Extraction
(agents, purifn. of **pentafluoroethane**)
IT Hydrocarbons, uses
(halo, extractant; purifn. of **pentafluoroethane** by using extractants)
IT 60-29-7, Diethyl ether, uses 64-17-5, Ethanol, uses 64-19-7, Acetic acid, uses 67-64-1, Acetone, uses 75-05-8, Acetonitrile, uses 96-22-0, 3-Pentanone 108-10-1, Isobutyl methyl ketone 108-24-7, Acetic anhydride 109-99-9, Tetrahydrofuran, uses 123-38-6, Propionaldehyde, uses 141-78-6, Ethyl acetate, uses 565-80-0, 2,4-Dimethyl-3-pentanone 113797-94-7, Acetone-water mixt.
(extractant; purifn. of **pentafluoroethane** by using extractants)
IT **354-33-6P, HFC 125**
(purifn. of **pentafluoroethane**)
IT **76-15-3, CFC 115**
(purifn. of **pentafluoroethane** by using extractants)

L19 ANSWER 7 OF 15 HCA COPYRIGHT 2004 ACS on STN
124:116646 Process for the purification of **pentafluoroethane**.
Ewing, Paul Nicholas; Corr, Stuart; Martin, John Stuart; Watson, Michael John (Imperial Chemical Industries PLC, UK). PCT Int. Appl. WO 9527689 A1 19951019, 16 pp. DESIGNATED STATES: W: CA, CN, JP, KR, MX, US; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC,

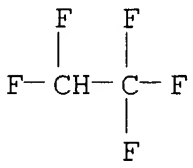
NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1995-GB672 19950327. PRIORITY: GB 1994-6961 19940408; GB 1994-17868 19940906; GB 1994-20510 19941011.

AB The title process for removal **chloropentafluoroethane** (I) comprises adding to the impure **pentafluoroethane** (II) a component which undergoes a non-ideal interaction with I and/or with the **azeotrope** of I and II such that the volatility of I and/or the **azeotrope** of of I and II relative to bulk II is increased.

IT **354-33-6P, Pentafluoroethane**
(process for the purifn. of **pentafluoroethane**)

RN 354-33-6 HCA

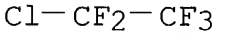
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3, CFC 115**
(process for the purifn. of **pentafluoroethane**)

RN 76-15-3 HCA

CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-386

CC 23-3 (Aliphatic Compounds)

ST **pentafluoroethane** purifn; **chloropentafluoroethane** removal **pentafluoroethane**

IT **354-33-6P, Pentafluoroethane**
(process for the purifn. of **pentafluoroethane**)

IT **76-15-3, CFC 115**
(process for the purifn. of **pentafluoroethane**)

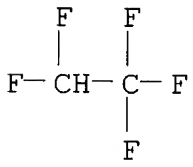
L19 ANSWER 8 OF 15 HCA COPYRIGHT 2004 ACS on STN

122:58823 Purification of a component of a binary **azeotrope** by multiple **distillations**. Clemmer, Paul Gene; Tung, Hsueh Sung; Smith, Addison Miles (AlliedSignal Inc., USA). PCT Int. Appl. WO 9419301 A1 19940901, 16 pp. DESIGNATED STATES: W: JP, KR; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1994-US1117 19940131. PRIORITY: US 1993-23827 19930223.

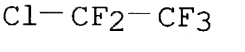
AB The process comprises (a) subjecting a binary **azeotrope** to a **distn.** step in which most of one of the binary

components is removed as **distillate** (**distillate** 1) with the bottoms (bottoms 1) enriched in the other component; (b) subjecting **distillate** 1 to ≥1 addnl. **distn**. step at a different pressure in which most of the component recovered as bottoms 1 is removed as **distillate** 2 with the bottoms 2 enriched in the component enriched in **distillate** 1; and (c) recovering the desired purified component. The invention is particularly useful in the purifn. of **pentafluoroethane** in a **pentafluoroethane/chloropentafluoroethane azeotrope.**

IT **354-33-6P, Pentafluoroethane**
(purifn. of component of binary **azeotrope** by multiple **distn.**)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**
(purifn. of component of binary **azeotrope** by multiple **distn.**)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-38
ICS C07C019-08; B01D003-14
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
ST purifn **pentafluoroethane chloropentafluoroethane azeotrope**
IT **Azeotropes** and **Azeotropy**
(**pentafluoroethane-chloropentafluoroethane;** purifn. of component of binary **azeotrope** by multiple **distn.**)
IT **354-33-6P, Pentafluoroethane**
(purifn. of component of binary **azeotrope** by multiple **distn.**)
IT **76-15-3**
(purifn. of component of binary **azeotrope** by multiple **distn.**)

L19 ANSWER 9 OF 15 HCA COPYRIGHT 2004 ACS on STN
121:230319 Purification of **chloropentafluoroethane** impurity from **pentafluoroethane** by catalytic fluorination and **distillation**.. Lacroix, Eric; Lantz, Andre; Cheminal, Bernard (Elf Atochem S.A., Fr.). Eur. Pat. Appl. EP 612709 A1 19940831, 9 pp. DESIGNATED STATES: R: BE, DE, ES, FR, GB, GR, IE, NL. (French). CODEN: EPXXDW. APPLICATION: EP 1994-400274 19940209. PRIORITY: FR 1993-2119 19930224.

AB **Pentafluoroethane** (I) is purified of its major contaminant, **chloropentafluoroethane** (II), by subjecting the II-contg. I to a gas-phase catalytic (e.g., Cr2O3, Ni-Cr alloy, etc.) fluorination in the presence of HF so as to convert the II to hexafluoroethane which is sepd. from the I by **distn.**

IT **76-15-3P, Chloropentafluoroethane**
(purifn. of **pentafluoroethane** from **chloropentafluoroethane** contaminant by catalytic fluorination and **distn.**)

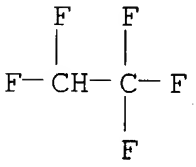
RN 76-15-3 HCA

CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

IT **354-33-6P, Pentafluoroethane**
(purifn. of **pentafluoroethane** from **chloropentafluoroethane** contaminant by catalytic fluorination and **distn.**)

RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C07C017-38
ICS C07C019-08

CC 23-3 (Aliphatic Compounds)
Section cross-reference(s): 45, 48, 67

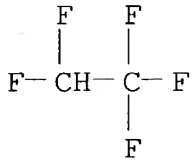
ST fluoroethane purifn fluorination **distn** chlorofluoroethane; nickel catalyst fluorination chlorofluoroethane purifn fluoroethane; chromium catalyst fluorination chlorofluoroethane purifn fluoroethane

IT Fluorination catalysts
(nickel and/or chromium derivs. for purifn. of **pentafluoroethane** from **chloropentafluoroethane**

contaminant)
IT Fluorination
(purifn. of **pentafluoroethane** from **chloropentafluoroethane** contaminant by gas-phase)
IT 1308-38-9, Dichromium trioxide, uses 7440-02-0D, Nickel, oxides, halides and/or oxyhalides 7440-47-3D, Chromium, oxides, halides and/or oxyhalides 11105-45-6, Chromium-nickel alloy
(catalyst precursor; purifn. of **pentafluoroethane** from **chloropentafluoroethane** contaminant by catalytic fluorination and **distn.**)
IT 7664-39-3, Hydrogen fluoride, reactions
(fluorinating agent; purifn. of **pentafluoroethane** from **chloropentafluoroethane** contaminant by catalytic fluorination and **distn.**)
IT 7782-41-4
(fluorination, purifn. of **pentafluoroethane** from **chloropentafluoroethane** contaminant by gas-phase)
IT **76-15-3P, Chloropentafluoroethane**
(purifn. of **pentafluoroethane** from **chloropentafluoroethane** contaminant by catalytic fluorination and **distn.**)
IT 76-16-4P, Hexafluoroethane
(purifn. of **pentafluoroethane** from **chloropentafluoroethane** contaminant by catalytic fluorination and **distn.**)
IT **354-33-6P, Pentafluoroethane**
(purifn. of **pentafluoroethane** from **chloropentafluoroethane** contaminant by catalytic fluorination and **distn.**)

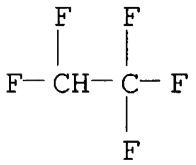
L19 ANSWER 10 OF 15 HCA COPYRIGHT 2004 ACS on STN
121:187948 Measurements of the Vapor Pressures of Difluoromethane, 1-Chloro-1,2,2,2-tetrafluoroethane, and **Pentafluoroethane.**
Weber, L. A.; Silva, A. M. (Thermophysics Division, National Institute of Standards and Technology, Gaithersburg, MD, 20899, USA). Journal of Chemical and Engineering Data, 39(4), 808-12 (English) 1994. CODEN: JCEAAX. ISSN: 0021-9568.
AB New measurements are presented of the vapor pressures of difluoromethane (R32) from 235 to 265 K, of 1-chloro-1,2,2,2-tetrafluoroethane (R124) from 220 to 286 K, and of **pentafluoroethane** (R125) from 218 to 286 K. Measurements were made in two ebulliometers, one of glass and one of metal. Overall, pressures ranged from 13 to about 950 kPa. Vapor pressures of R125, calcd. via thermodn. relationships, for temps. down to 170 K (2.3 kPa) are also presented. The **azeotropic** mixt. of R125 with **chloropentafluoroethane** (R115) is studied, and the present data are cor. for a small R115 impurity.
IT **354-33-6, Pentafluoroethane**

(vapor pressure of)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



CC 65-6 (General Physical Chemistry)
IT 75-10-5, Difluoromethane **354-33-6**, **Pentafluoroethane** 2837-89-0, 1-Chloro-1,2,2,2-tetrafluoroethane
(vapor pressure of)

L19 ANSWER 11 OF 15 HCA COPYRIGHT 2004 ACS on STN
120:167285 **Azeotropic** mixture of **pentafluoroethane** with **pentafluorochloroethane** and separation of **pentafluorochloroethane** from the mixture. Tsuda, Takehide; Komatsu, Satoshi; Matsumoto, Takeo (Daikin Industries Ltd., Japan). PCT Int. Appl. WO 9323355 A1 19931125, 12 pp. DESIGNATED STATES: W: AU, BR, CA, KR, RU, US; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (Japanese). CODEN: PIXXD2. APPLICATION: WO 1993-JP637 19930514. PRIORITY: JP 1992-124608 19920518.
AB The title process comprises **distg.** the mixt. to thereby evap. an **azeotropic** mixt.composed of both the halogenated ethanes. **Azeotropic distn.** of a mixt. contg. 360 g R-125 and 15.5 g R-115 gave 150 g R-125 contg. 30 ppm R-115.
IT **354-33-6**, R-125
(sepn. of, from R-115, by **azeotropic distn.**)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IT **76-15-3**, R-115
(sepn. of, from R-125, by **azeotropic distn.**)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

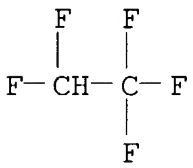
$Cl-CF_2-CF_3$

IC ICM C07C019-08
ICS C07C017-38
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
ST **pentafluoroethane pentafluorochloroethane azeotropic distn** sepn
IT **354-33-6**, R-125
(sepn. of, from R-115, by **azeotropic distn.**)
IT **76-15-3**, R-115
(sepn. of, from R-125, by **azeotropic distn.**)

L19 ANSWER 12 OF 15 HCA COPYRIGHT 2004 ACS on STN
120:137681 **Azeotrope**-like chlorofluorocarbon working fluids for refrigeration use. Gu, Guodong (Peop. Rep. China). Faming Zhuanli Shenqing Gongkai Shuomingshu CN 1069048 A 19930217, 11 pp. (Chinese). CODEN: CNXXEV. APPLICATION: CN 1992-109714 19920821.
AB The effective working fluids with less ozone-depleting effect comprise an **azeotropelike** compn. selected from (a) R12, R13; (b) R11, R114, R115; and (c) R132, R125, R134a, R152a, R22, R23, R32 and a compatibilizer selected from ≥2 groups of (d) R142b, R152a, R32; (e) R125, R124; (f) R225a, R225b; and (g) R141b, R141, R113, R115. A working fluid contained R22 40-60, R23 20-25, R152a 5-10, R115 20-25, and R142b 5-10 mol%.
IT **76-15-3**, R115 **354-33-6**, R125
(**azeotropelike** compn., contg. compatibilizer, for refrigerants)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

$Cl-CF_2-CF_3$

RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C09K005-00
CC 45-5 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
Section cross-reference(s): 59

ST **azeotropelike** halocarbon compn refrigerant; compatibilizer working fluid **azeotrope** refrigeration; chlorofluorocarbon refrigerant; fluorochlorocarbon refrigerant

IT Refrigeration
(agents, **azeotropelike** halocarbon compn., contg. compatibilizer, effective with less environmental damage)

IT Hydrocarbons, uses
(chloro fluoro, **azeotropelike** compn., for refrigerants with less environmental damage)

IT 75-10-5 75-37-6, R152a 75-45-6, R22 75-46-7, R23 75-69-4, R11 75-71-8, R12 75-72-9, R13 76-14-2, R114 **76-15-3**, R115 306-83-2, R123 **354-33-6**, R125 811-97-2, R134a
(**azeotropelike** compn., contg. compatibilizer, for refrigerants)

IT 75-68-3, R142b 76-13-1, R113 430-57-9, R141 1717-00-6, R141b 2837-89-0, R124 127564-92-5
(compatibilizer, **azeotropelike** halocarbon compn. contg., for refrigerants)

L19 ANSWER 13 OF 15 HCA COPYRIGHT 2004 ACS on STN

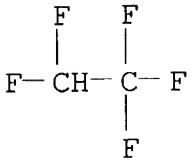
117:29188 Near-**azeotropic** blends for use as refrigerants. Bivens, Donald Bernard; Shiflett, Mark Brandon; Yokozeki, Akimichi (du Pont de Nemours, E. I., and Co., USA). PCT Int. Appl. WO 9201762 A1 19920206, 41 pp. DESIGNATED STATES: W: BR, CA, JP, KR; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, NL, SE. (English). CODEN: PIXXD2. APPLICATION: WO 1991-US4100 19910617. PRIORITY: US 1990-558346 19900726; US 1991-681565 19910405.

AB Near-**azeotropic** blends comprising **HFC-125** and HFC-143a with 1 or more of HCFC'-22, HFC'=134a, HFC-134, etc., or HCFC-22 and(or) **HFC-125** with 1 or more of HC-290, FC-128 or HFC-161 are equal to the vapor pressure of refrigerant-502 (HCFC-22 and **CFC-115** 48.8 and 51.2 wt.%, resp.), are useful as refrigerants. A refrigerant compn. of **HFC-125**/**HFC**-143a/HFC-134a (55/40/5 wt.%) exhibit very low vapor pressure changes after ≥80 wt.% of the charge was leaked, showing that he compns. could maintain their vapor pressure characteristics, even if 80 wt.% of refrigerant were lost.

IT **354-33-6**, **HFC-125**
(near-**azeotropic** blend contg., as refrigerant)

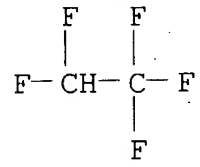
RN 354-33-6 HCA

CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C09K005-04
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
ST near **azeotropic** blend refrigerant; **HFC125** HFC143a HCF134a blend refrigerant
IT Refrigeration
(agents, near-**azeotropic** blends)
IT 74-84-0, Ethane, uses 74-98-6, Propane, uses 75-28-5, Isobutane 75-45-6, HCFC 22 76-19-7 106-97-8, Butane, uses 115-07-1, Propylene, uses 115-10-6, DME 353-36-6 354-25-6 **354-33-6, HFC-125** 359-35-3, HFC 134 420-46-2, HFC 143a 431-89-0, HFC 227ea 811-97-2, HFC 134a 931-91-9 2837-89-0
(near-**azeotropic** blend contg., as refrigerant)

L19 ANSWER 14 OF 15 HCA COPYRIGHT 2004 ACS on STN
73:14151 **Chloropentafluoroethane-pentafluoroethane azeotropic** refrigerants. Clark, Jared Wilson; Rectenwald, Charles E. (Union Carbide Corp.). U.S. US 3505233 19700407, 2 pp. (English). CODEN: USXXAM. APPLICATION: US 1968-775206 19681112.
AB ClCF2CF3 21 and 79 wt. % CHF2CF3, b. -48°, was an **azeotrope** useful as a refrigerant.
IT **354-33-6**
(**azeotrope** with **chloropentafluoroethane**)
RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

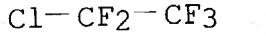


IT **76-15-3**
(**azeotrope** with **pentafluoroethane**)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)

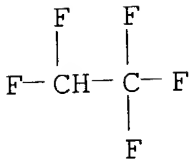
$Cl-CF_2-CF_3$

IC C09K
NCL 252067000
CC 23 (Aliphatic Compounds)
ST **azeotropic** refrigerants **pentafluoroethane** chloro; refrigerants **azeotropic pentafluoroethane** chloro; **pentafluoroethane** chloro **azeotropic** refrigerants; **chloropentafluoroethane azeotropic** refrigerants
IT **354-33-6**
(**azeotrope** with **chloropentafluoroethane**)
IT **76-15-3**
(**azeotrope** with **pentafluoroethane**)

L19 ANSWER 15 OF 15 HCA COPYRIGHT 2004 ACS on STN
47:58499 Original Reference No. 47:9908b-e The action of elementary fluorine upon organic compounds. XVII. The direct fluorination of acetonitrile. Cuculo, John A.; Bigelow, Lucius A. (Duke Univ., Durham, NC). Journal of the American Chemical Society, 74, 710-13 (Unavailable) 1952. CODEN: JACSAT. ISSN: 0002-7863.
AB cf. C.A. 44, 9363a; 45, 3800h; 46, 1432f. MeCN was fluorinated in the vapor phase over a Cu-shot packing under a variety of operating conditions. At lower fluorination ratios were formed CF4, C2F6, CF3CHF2, CF3CH2F, (CF2H)2, MeCF3, and a polymer contg. N; fluorination under these conditions with He as a diluent showed that no N was given off during the reaction. At higher ratios, CF4 and C2F6 were formed, accompanied by the highly volatile corrosive CF2:NF and CF3CF2NF2 (I) and highly fluorinated, stable, polymeric compds. I, obtainable in 20% yield at 275°, was stable to an excess of F at 400°; the polymeric material was still stable at 475°, but not at 600°. CF3CF2Cl b. -38°. CCl3CF3 b. 45-6°, f.p. 14°, ND20 1.3602. C2F6 b. -75°. CF3CHF2 b. -48°. CHF2CF2Cl b. -13°. An **azeotropic** mixt. of CHF2CHF2 and CF3CH2F b. -29°. I b. -38°, f.p. -183°. CF2:NF b. -101°. The **azeotrope** of C2F6 and C2H6 b. -94°. CF2:NF has a pungent, nauseating odor, and is presumably very toxic.
IT **76-15-3**, Ethane, chloropentafluoro- **354-33-6**, Ethane, pentafluoro-
(prepn. of)
RN 76-15-3 HCA
CN Ethane, chloropentafluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



RN 354-33-6 HCA
CN Ethane, pentafluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



CC 10 (Organic Chemistry)
IT **76-15-3**, Ethane, chloropentafluoro- 338-66-9, Methylenimine, trifluoro- 354-25-6, Ethane, 1-chloro-1,1,2,2-tetrafluoro- **354-33-6**, Ethane, pentafluoro- 354-58-5, Ethane, 1,1,1-trichloro-2,2,2-trifluoro- 354-80-3, Ethylamine, heptafluoro- 359-35-3, Ethane, 1,1,2,2-tetrafluoro- 420-46-2, Ethane, 1,1,1-trifluoro- 811-97-2, Ethane, 1,1,1,2-tetrafluoro-
(prepn. of)